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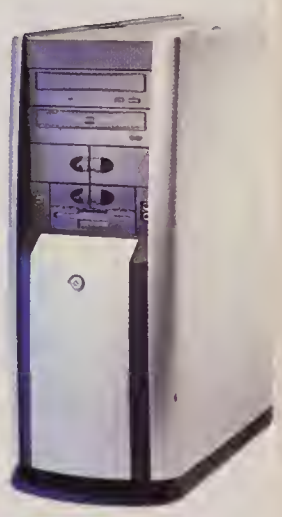
Web Marketers Reach New Depths of Sleaze: How to Guard Your PC

Our Lab Pinpoints the Top Values in Today's Super-Fast Notebooks

COMPLETE 2002 buyer's guide



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SEPTEMBER 2002

VOLUME 20 ◆ NUMBER 9

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MAIN SECTIONS

SYSTEMS

90 The Box

Desktop and notebook computer systems—the platform for all things PC.

COMPONENTS

98 Inside the Box

The prime upgrade components: motherboards, CD-RW and DVD drives, hard drives, and graphics cards.

PERIPHERALS

112 Outside the Box

Printers, monitors, and scanners, as well as broadband and home networking gear.

MOBILE GEAR

128 Beyond the Box

Digital lifestyle: cameras, camcorders, PDAs, phones, and MP3 players.

BUYING SITES

140 Best Places to Buy

We evaluate 12 online shopping sites for PC products to find out which ones offer the best deals with the least hassle.

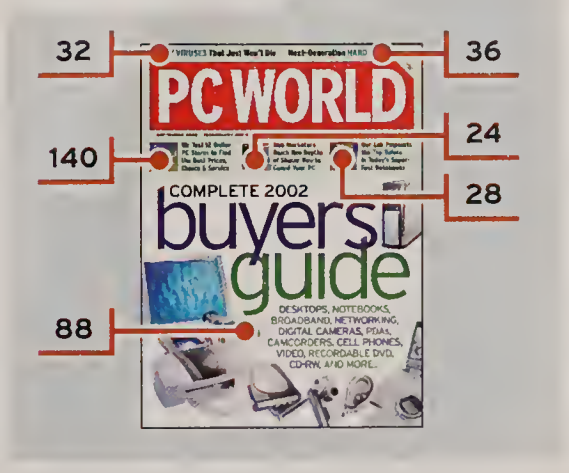
SPECIAL ISSUE

88 2002 Buyers' Guide

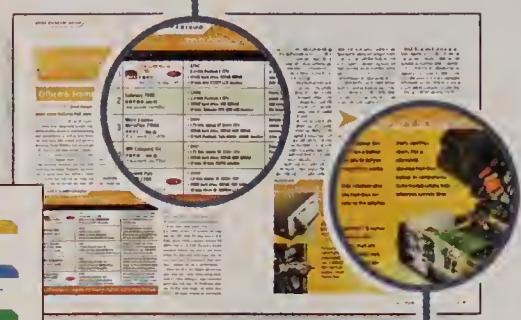
Every edition of *PC World* assists you when it's time to buy computer products. But this month's special guide provides more buying information than we've ever assembled in one issue, covering 17 of the most important product types (and incorporating the *Top 100* product reviews section). Already know what you want to buy? Find out on page 140 where you should shop.

Cover Photography by Marc Simon

ON THE COVER



WHERE'S THE TOP 100?
Don't worry. This month only, we cover the *Top 100* categories and more in our Buyers' Guide, starting on page 88, with charts, close-ups, and other special features.



Charts: Rankings and detailed comparisons of select products.

Close-ups: Key features to look for when you shop.

DEPARTMENTS

19 **Up Front**

41 **Letters**

49 **Consumer Watch**
PC makers are dwindling.

57 **Web Savvy**
Browse with bookmarklets.

59 **Home Office**
Increase your Word power.

61 **Bugs and Fixes**
Virus hoaxes hurt, too.

190 **Full Disclosure**
Apples keep tempting.

RESOURCES

14 **How to Contact PC World**

172 **PC World Marketplace**

188 **Advertiser Index**

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COMING UP IN OCTOBER

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Practical Upgrades: Discover five ways to improve your computer's capabilities, and learn how you can avoid snags along the way.

Graphics Boards: The PC World Test Center put current and next-generation models through their paces, and we find two Best Buys.

Dynamite Downloads: We review 25 great freeware and shareware programs, and tell you the pitfalls to look out for when downloading.

NEWS & TRENDS

24 **Web Ad Ambush**
Financed by ad dollars from big names, online marketers are embracing more-aggressive tactics.

28 **Notebooks Zip to 2 GHz-Plus**
Laptops based on Intel's new 2-GHz Pentium 4-M offer only modest performance improvements.

32 **The Virus That Won't Die**
Klez threatens to become the most prolific virus ever, as harmful strains continue to vex users.

34 **Magnificent Seven-Color Printing**
Epson's Stylus Photo 2200 outguns other photo ink jet printers by providing a seventh ink color.

36 **Your Next Hard Drive**
Serial ATA drives are faster and will allow more-compact PC designs; capacity is on the rise, too.

36 **Gigabit Networking for Small Offices**
New 1000-mbps ethernet products put higher transfer speeds within reach of small businesses.

NEW PRODUCTS

68 **Web Browsers**
Mozilla 1, Netscape 7, RapidBrowser XP

70 **Wireless Networking Hardware**
U.S. Robotics Access Point, PC Card, and Adapter

72 **Image Editor**
Adobe Photoshop Elements 2

74 **Notebook**
Alienware Area-51m

79 **Compression Software**
Aladdin StuffIt Deluxe 7.5, PentaWare PentaZip 5.1

80 **Database Software**
FileMaker 6

See page 69 for a complete list of new products reviewed.

HERE'S HOW

158 **Windows Tips**
Use Windows' passwords for desktop security—or turn them off; download a handy card-file utility.

162 **Internet Tips**
Opt out of spam; log off Outlook Express the right way; get RealOne free without the hassles; a power chatting tool; Domain Name Buyer's Guide RIP.

164 **Step-By-Step**
Ensure that your new drives run at optimal speed.

166 **Hardware Tips**
Find the best use for an old PC; uncover the source of Windows error messages; silence your modem.

170 **Answer Line**
Share Works files with non-Works users; customize the Places Bar in Windows' dialog boxes.

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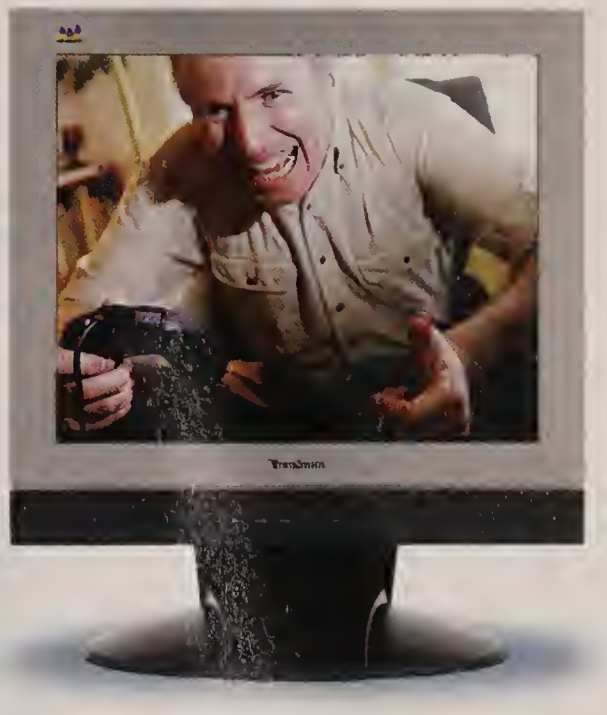

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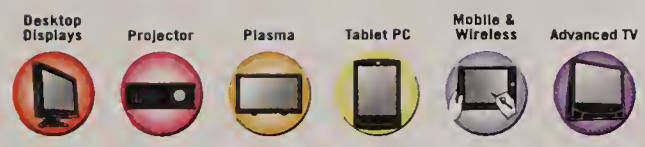

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UP FRONT

HARRY McCRACKEN

Shopping for Technology? Start Here

New products, new decisions—and a new kind of buying guide.

2002 Buyers' Guide: It's an unassuming name for a decidedly out-of-the-ordinary issue of *PC World*. Not that the subject matter itself is a departure—helping you choose the right technology products for your business and your home has been our stock-in-trade for almost two decades. But we've never poured this much shopping advice or so many hardware recommendations into one issue.

And that's because there have never been so many categories to ponder. Or products to consider. Or buzzwords to decode. Sure, some dilemmas get less daunting over time—for example, selecting a desktop computer today is not the head-scratcher it was back when a garden-variety system set you back $3000 and every bit of processing power mattered.

Still, the PC's ever-increasing versatility keeps prompting new questions. What's the least stressful way to network your house or your small office—802.11a, 802.11b, HomePlug, or HomePNA? Will busting your budget on a 4-megapixel digital camera really get you better pictures? Is the time right to invest in a rewritable DVD drive, or should you hold off? Oh, and once you've chosen a product, where should you plunk down your money?

Starting on page 88, we devote our entire feature section to solving puzzles like these. With sections on 17 product categories, the guide—spearheaded by Senior Editor Alan Stafford—represents the collective expertise of the *PC World* team in highly concentrated, seriously practical form. Why the special issue? "We put tons of buying advice in every issue, from large roundup reviews to the *New Products* section," Stafford explains. "But that information is spread over multiple issues—this guide's a one-issue reference you can pick up again and again."

TECH ADVISOR: Senior Editor Alan Stafford.

As you'd expect, the guide offers plenty of specific product picks—many based on benchmarking by the PC World Test Center. To ensure a long shelf life, the issue is also bursting with how-to shopping advice—what new technologies are worth your money, which specs do and don't matter, and ways to winnow the field to find the equipment that's right for you.

One thing may appear to be missing: This is the first issue of *PC World* in six years that doesn't include the *Top 100* hardware review section. However, "the *Top 100* didn't really take a break this month," says Stafford. Every product category from that section is in the Buyers' Guide. In addition, Stafford notes that "we tested and reviewed many more products than we do in a typical month." As usual, the complete *Top 100* is available at PCWorld.com at www.pcworld.com/reviews. In fact, "thanks to a redesign, the online *Top 100* charts now include even more information than they ever have."

PCWorld.com has an interactive version of the Buyers' Guide as well, with extra tips and links to our Product Finder. The *Top 100* will return in the October issue.

MERCHANTS WITH THE MOST

OUR GUIDE IS mostly about *what* to buy. But "Such a Deal? The Best and Worst Places to Buy on the Web" (page 140) rates today's tech reseller sites—from behemoths to tiny outfits. As Contributing Editor Anne Kandra reveals, going online for gear brings both an array of benefits and a fair share of pitfalls. Prices are low, selection is sweeping, and hundreds of sellers hanker for your business. But a slick home page is no guarantee of stellar service, and prices that seem impossibly low may be just that. (Tip number 1: Do the math on shipping costs before you fork over your credit card number.)

Read Kandra's feature for a no-holds-barred report on our buying expedition. And if you've got comments on any aspect of our Buyers' Guide, drop me a line at harry_mccracken@pcworld.com. ■

Harry McCracken is editor of PC World.

Tell Us What You Think: Visit www.pcworld.com/pcwinput and rate this issue—you could win $500. You'll need your subscriber number from the mailing label to take this survey online. The Web site explains the official rules and also how to participate in the drawing if you're not a subscriber. You can enter from August 1 through August 30, 2002.

PHOTOGRAPH: ROBERT CARDIN

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What's new and what's next in technology

NEWS & TRENDS

EDITED BY RAMON G. McLEOD

INSIDE

26 OUTFOX THE MARKETERS

28 LAPTOPS ZIP TO 2 GHZ AND BEYOND

32 KLEZ: THE VIRUS THAT WON'T DIE

34 EPSON'S MAGNIFICENT SEVEN-COLOR INK JET

36 YOUR NEXT HARD DRIVE

36 GIGABIT NETWORKS

WEB AD EXPLOSION

FINANCED BY CORPORATE AD DOLLARS, SOME ONLINE MARKETERS ARE GETTING SNEAKIER—AND MORE ANNOYING. BY TOM SPRING

ILLUSTRATION: JEFF BERLIN

HAS YOUR browser's home page changed suddenly in recent months? Does your desktop sport a toolbar you don't remember asking for? Is your system tray crowded with mystery applications? You're not imagining things: Online advertising is more cunning, aggressive, and infuriating than ever. More than 25 percent of top Web destinations now use some kind of in-your-face marketing tactics, according to the Internet research firm Cyveillance.

Worse, corporate America is financing some of these intrusive ad campaigns. A *PC World* investigation shows that in today's complex Web economy, even reputable companies such as Citibank, Ford, and Sears can wind up paying commissions to aggressive Web marketers—often without realizing it. And since the marketers have little or no government regulation to hamper them—and enjoy the powerful incentive of lucrative

ad budgets to underwrite their costs—the new and aggravating practices aren't likely to go away anytime soon.

Perhaps you've experienced some of these tactics, such as InternetFuel's method of pelting you with pop-up advertisements as you leave a site, or Search-Explorer.com's mouse-over downloads that can cause software to be downloaded to your PC's hard drive after you merely roll your pointer across an advertisement. Programs from Brilliant Digital Entertainment, Cydoor Technologies, and Gator may ride along when you install downloaded file-sharing software or Internet utilities. Then there are those InternetAlert pop-up advertisements: They look like Windows' system warnings.

There's nothing illegal about these actions, and they don't run afoul of any government regulations. Rudy Grahn, an analyst for Jupiter Research, says advertising regulations—which historically have been aimed at broadcast and print media—simply haven't yet caught up with the latest online strategies.

Yet the targets of aggressive marketing, including consumers and businesses, must contend with the adverse impact on PC and network performance (for details, see find.pcworld.com/30152). And irritated Web surfers have made their feelings abundantly clear on gripe sites. "What I don't understand is why this...isn't illegal," wrote one typical poster at Spywareinfo.com, which tracks online privacy issues. "Seems like a clear form of cyberterrorism to me."

Fueling this ad explosion is an estimated $9.6 billion that the GartnerG2 research firm says will be spent on Internet advertising in 2002. Web sites can now earn bounties for snagging your attention, your browser, your hard drive, or your name. For example, sites can earn up to 5 cents for each visitor who installs marketing software from the Webmaster Revenue Network, according to the company's Web site (www.wrn.net). They can collect as much as 20 cents for learning your zip code and e-mail address, say people who are familiar with the industry. And Web sites that ran those ubiquitous advertisements for X-10 wireless cameras may have earned up to $45 for each $90 sale they generated, according to Pesach Lattin, who is the author of the online marketing e-newsletter *Adbumb*. Adds Lattin: "The reason there's an upsurge in advertising sleazeware is because it works."

"The reason there's an upsurge in advertising sleazeware is because it works."

PESACH LATTIN,
author of *Adbumb* newsletter

YOU DON'T EVEN NEED TO CLICK

WHILE MOST marketing software requires the user to click his or her assent before it installs, some newer technologies bypass this step. Earlier this year, for example, sites ran an ad that automatically downloaded a toolbar from Search-Explorer.com if the user moved their mouse over the ad while their browser was set to a low level of security. AdPowerZone, which created the toolbar, says it has the ability to track "every Web site the user visits, allowing our advertisers to send special offers to our users in real time while they are online." About 1.3 million people downloaded the software over a four-week period, the firm says.

AdPowerZone's president, Yves Lavoie, says that by mid-July only one Web site was still offering the mouse-over download. He notes that automatic installs occurred only if users had set their Web browsers to allow them.

Similar browser settings may enable some of Bonzi Software's pop-up ads to create a directory on your hard drive and download the company's marketing mascot, an animated purple gorilla that pitches to you whether you are online or off. "All we are trying to do is grab your ▶

IN BRIEF

Product Pipeline

TWO DVD DRIVES IN ONE: Look for the first multiformat rewritable-DVD drives to be on store shelves later this fall. Hitachi, Panasonic, and Samsung all expect to ship drives that can write to DVD-R, DVD-RW, and DVD-RAM, as well as to CD-R/RW; expect the drives to sell for between $300 and $500. What these multiple-format drives still lack, however, is the ability to write to the third leading rewritable format, DVD+RW/+R.

NOW HEAR THIS: Best known for its mice, keyboards, and webcams, Logitech is getting into the cell phone earpiece business. This fall the company will introduce a new line of wired and wireless headsets for popular cell phones. Prices are expected to range from $15 for an entry-level corded model to just under $100 for a cordless unit.

Did You Know?

1 BILLION

NO KIDDING!: The PC industry shipped its 1 billionth personal computer earlier this year, according to research firm Gartner Dataquest. The milestone, a combination of desktop and notebook PC sales around the world, comes nearly 25 years after the 1974 introduction of the Altair PC—generally recognized as the first commercially successful PC. The 2 billion mark is expected to be reached much faster—in 2008, Gartner says.

PHOTOGRAPH: JOHN ABBOTT

attention the same way the employee outside Wal-Mart does by telling you what's on sale as you walk in," says Bonzi's John Epstein.

Britain-based C2 Media's MP3 Search application, which is distributed by sites such as MP3Search.com, promises to help you locate digital music. When we installed the software in April, however, it also switched our browser home page and default search engine to the Lop.com Web site. A Lop.com toolbar—with ads for Citibank, the Columbia House Record Club, Ford, and Sears—appeared, as did 89 new bookmarks, many of which pointed to Lop.com. And landing on Lop.com triggered a flock of pop-up and pop-under ads.

INFORMED CONSENT?

WE SHOULDN'T have been surprised. The software's user agreement outlined the various changes that would be made to our system. But not everyone reads such agreements carefully. And at least one site distributing the software, PornLabs.com, advised Webmasters to rename the download as "mp3_finder.exe" or "napster2.exe" in order to "help induce the surfers to run and accept the software."

PC World tried to contact the owners of PornLabs.com, who are listed with the Web domain name registrar VeriSign as Toiling Robots, but could not reach them. C2 Media founder and coprincipal Alex Shamash says he knows nothing about Toiling Robots. As for the downloads, he says, "Everybody knowingly accepts the terms of the software." And C2 Media is just one of many companies that make money by generating ad "impressions"—an industry term used to refer to the number of times an ad is displayed—and the resulting traffic to customer sites.

How do ads from big companies such as Citibank and Ford wind up on tiny Web sites? Corporations or their agencies often place a certain percentage of ads through middlemen such as Advertising.com, ClickXchange, or Commission Junction. Such middlemen may, in turn, route the ads to hundreds or thousands of affiliated sites. ClickXchange, for example, has some 150,000 affiliates that run banner ads for 460 advertisers, according to Craig Tammel, chief technology officer. And each day hundreds more sites inquire about joining the program.

Given these numbers, it can be impractical or even impossible for a middleman to police every affiliate. For example, General Counsel and Vice President Tom McMahon at Advertising.com said he was not aware of the details of how C2 Media generated ad impressions when he was first contacted by a *PC World* reporter, although C2 Media was an affiliate at the time. The two companies have since ended their relationship.

Agencies and companies also place ads through brokers who buy and resell bulk inventory of online ads for a small profit, says Lattin. In these transactions, he adds, it's possible to lose control over exactly where an ad is placed—explaining how a mainstream ad can end up on a porn site even if the sponsor forbids marketing on such sites. "Half the companies [advertising with these sites] may not even know it," he says.

A POTENTIAL FOR HUGE PROFITS

THE AFFILIATES who distribute these advertisements can earn substantial cash, as demonstrated by a recent federal court case in Philadelphia. A judge ordered Web marketer John Zuccarini to pay back $1.8 million in "ill-gotten gains" from tricking people to view banner ads and visit Web sites run by pornographers and a self-styled psychic named Miss Cleo. Unfor-

DEFENSE

OUTFOX THE MARKETERS

IN THE ABSENCE of government regulation and effective self-policing of aggressive online marketing technology, consumers must fend for themselves. Here are some tips to help you cope:

- **Read the license carefully:** Check for clauses about software that seem unrelated to the application you intend to install on your PC.
- **Get software that fights adware:** Ad-aware, PestPatrol, and Spybot-Search & Destroy can remove offending software; ZoneAlarm lets you know when your PC tries to send data to the Internet.
- **Check out freebies:** Consult Spychecker.com, which maintains an online database of software that bundles advertising components.

- **Adjust your browser settings:** Make sure that your Internet Explorer security levels (select *Tools•Internet Options•Security*) are set to Medium (or higher), which prevents automatic software installations. Set the browser to prompt you before running programs like ActiveX applets that can start automatically.
- **Learn the lingo:** Don't trust an ActiveX applet just because a dialog box tells you it's been "signed." This language just means the applet is really from the site it claims to be from. It says nothing about what the applet does.
- **Remove any unwanted ActiveX applets:** To do so, go to *Tools•Internet Options•General•Settings•View Objects*. Right-click any questionable programs and select *View Properties* to see where they came from. If you want to uninstall one, right-click it again and select *Remove*.
- **Get uninstallers:** Some adware can't easily be removed through Control Panel's Add/Remove Programs window. If this happens, check the adware company's Web site for an uninstall program that can eliminate it completely.

ILLUSTRATION: JEFF BERLIN

tunately, Zuccarini vanished without paying, and is still being sought by Federal Trade Commission investigators.

HOW THE SYSTEM CAN GO WRONG

THE CASE offers insight into how an unscrupulous operator can exploit the system. Prosecutors said Zuccarini registered about 5500 Internet domain names that were misspelled versions of popular, legitimate domain names—including 41 variations on "Britney Spears." Surfers who misspelled the singer's name in a Web search could wind up at a Zuccarini site where they were bombarded by multiple pop-ups. Attempting to close one of these windows or to click a Back button simply launched new pop-ups. In this way, Zuccarini generated ad impressions for legitimate middlemen such as Commission Junction. The firm's chief executive officer, Jeff Pullen, declines to say how much Commission Junction paid Zuccarini. But he says that at that time the company typically took 20 cents out of every dollar paid to affiliate sites for running ads.

"By the law of large numbers, some people are going to try to cheat the system," Pullen adds. But he says that misuse of the Commission Junction network has never been widespread and that the company is always on the lookout for abusers.

Though the Zuccarini scam was detected, regulatory agencies are hamstrung by the fact that there are few laws governing Internet ads. The FTC has filed suit against those it considers to be clear offenders—like Web sites that trick people into downloading programs that cause their modems to dial expensive 1-900 phone numbers. But the agency has no mandate to combat certain other questionable marketing practices.

Online marketers argue that self-regulation is the best way to protect consumers. One group that already serves as an industry watchdog is the National Advertising Division (NAD) of the Council of Better Business Bureaus. Andrea Levine, its director, points to a November 2001 case in which the NAD recommended that Bonzi Software modify ads for InternetBoost modem-optimization software. The pop-up ads looked like a Windows error message that declared: "Your Internet Connection Is Not Optimized. Download InternetBOOST 2001 Now!"

Online marketers say self-regulation is the best way to protect consumers.

The NAD recommended that Bonzi change the ad's appearance to make clear that it was marketing, not a Windows message. The group also asked the company to change the wording so as not to imply that a system defect had been detected. Bonzi changed "is not optimized" to read "may not be optimized," and also labeled the window clearly as an ad, says NAD attorney Peter Marinello. But this summer, ads for Bonzi's InternetAlert security program again looked similar to Windows warnings. The message this time: "Your Computer's Data is Currently at Risk. Download InternetALERT now."

Consumers who don't like Gator got some relief in July, when a federal judge ordered the firm to stop delivering pop-ups over sites run by some prominent media companies. Dow Jones, the *New York Times*, and the *Washington Post*, among others, alleged that the ads hurt their revenue by directing visitors to other sites. An attorney for Gator said the company was considering an appeal and believes it will win the case when it comes to trial.

CHANGING THE LAW

WASHINGTON MAY yet act to stop some of the worst abuses. The Senate Commerce Committee in May signed off on S. 2201, a bill that would require Web sites to inform visitors if they intend to collect personal information—for example, by tracking Web activity—or share it with others.

For now, however, you're mostly on your own in dealing with Web advertising (for specific advice, see "Outfox the Marketers" on page 26). "As soon as you think you've seen it all, advertisers are right back in your face with something new and even more annoying," says Lattin. So read the user agreements carefully, check your browser's security settings—and, even after taking those precautions, don't be too surprised if a wily Web marketer still manages to grab control of your PC. ▶

IN BRIEF

Product Pipeline

WI-FI PDA: The Toshiba Pocket PC E740 is the first personal digital assistant to ship with a built-in 802.11b (Wi-Fi) wireless adapter, which allows out-of-the-box Internet access via networks based on the popular standard. Carrying Intel's new 400-MHz PXA250 CPU for handhelds, the $599 device runs Microsoft's Pocket PC 2002 and comes with 64MB of RAM, as well as slots for CompactFlash and Secure Digital media.

Did You Know?

MUSIC WILL BE the surprise killer application that will juice the home networking market, predicts research firm Jupiter Media Metrix.

33 PERCENT About 33 percent of broadband users that the firm polled were interested in installing a home network to listen to PC music files on home stereos, according to a Jupiter Research study, which also found that sharing broadband was the first reason to adopt a network.

MOBILE

LAPTOPS ZIP TO 2 GHz-PLUS

NEW P4-M DEBUTS, BUT SOME VENDORS OPT FOR DESKTOP CHIP.

INTEL'S Pentium 4-M processor has reached the coveted 2-GHz mark, and speed-hungry mobile users will be tempted to buy a laptop with the chip. However, while our exclusive tests found 2-GHz P4-M notebooks among the fastest units we've tested, the new models failed to make dramatic gains compared with those based on Intel's 1.8-GHz mobile chip. Since 2-GHz notebooks carry a hefty price premium, buyers seeking both good performance and a good price might prefer a 1.8-GHz unit instead.

The PC World Test Center's first tests of 2-GHz P4-M–based models showed a close race. WinBook's N4, with 256MB of RAM, scored 98 on PC WorldBench 4—that's 4 points better, or about 4 percent faster, than the average of four previously tested, comparably configured 1.8-GHz notebooks. A 2-GHz Gateway 600XL with 512MB of RAM scored 100. All of the tested units ran Windows XP Pro.

GATEWAY'S NEW 600XL features Intel's fastest mobile processor, the 2-GHz Pentium 4-M.

The WinBook N4 ran for 2 hours, 19 minutes in our battery test. It costs $2794, but with a 1.8-GHz chip it sells for $2394—significantly less.

Our Gateway test system costs $3128 (after a $100 rebate). Its battery held out for 2 hours, 33 minutes. The same model with a 1.8-GHz chip runs $2828 (after rebate).

Outscoring those 2-GHz P4-M–based units in our tests were notebooks using Intel's desktop P4 processors. It's a growing trend: Consumers like desktop chips because they're fast; notebook vendors like them because they're cheaper than the mobile ones.

We tested two such models: an Alienware Area-51m and a Micro Express NP 5240, each with a 2.4-GHz Pentium 4 CPU, 512MB of memory, and Windows XP Pro. The NP 5240 scored 107 on PC WorldBench 4; the Area-51m scored 102.

The NP 5240 sells for a reasonable $2199. The Area-51m costs $2950; you'd pay $3244 to get it with a 2-GHz mobile chip (we review the Area-51m in *New Products*, page 74).

Using a desktop CPU, however, generates more heat and quickly drains a battery. The NP 5240 lasted just 1 hour, 35 minutes. With an optional second battery in place, the Area-51m lasted 3 hours, 4 minutes.

Devoted mobile users probably won't tolerate such compromises. For the best performance, price, and battery life, consider buying a 1.8-GHz P4-M unit. If you simply must have a model running at the fastest mobile speed, check out a 2-GHz P4-M notebook.

—*Tom Mainelli* ▶

TEST REPORT

PERFORMANCE PORTABLES

SYSTEM	CPU	RAM	PC WorldBench 4 score (Faster ▶)	Battery life (hours:minutes)
WinBook N4	2-GHz P4-M	256	98	2:19
Gateway 600XL	2-GHz P4-M	512	100	2:33
Alienware Area-51m	2.4-GHz P4 (desktop)	512	102	3:04 (two batteries)
Micro Express NP 5240	2.4-GHz P4 (desktop)	512	107	1:35
Average of four notebooks	1.8-GHz P4-M	256	94	n/a

TEST Center **HOW WE TEST:** All systems were tested with PC WorldBench 4, *PC World*'s applications-based benchmark. For more details, go to www.pcworld.com/benchmark. For the battery life test, we drain and fully recharge the battery twice and set power-saving options to match consistent high-performance and default profiles where possible. We report the time elapsed when the notebook shuts itself off. Higher scores are better. n/a = Not applicable.

IN BRIEF

Product Pipeline

SHRED ON: You shred your company's sensitive papers before you trash them, but what about the digital information that resides on old CDs and DVDs? Now you can obliterate these files too, using Alera Technologies' $70 DVD/CD Shredder. Just as a paper shredder makes written documents unreadable, Alera's product obliterates a disc's data layers, rendering digital information undecipherable, though the disc is unharmed. Capable of handling up to 30 discs per minute, the DVD/CD Shredder should help ensure that the next Dumpster-diver to visit your business won't find anything important to take.

Downloads

Head to find.pcworld.com/30032 to find these files.

TOP 5

1 **RegClean 4.1a** 800KB
Clean corrupted or unused Registry keys from your Microsoft Windows Registry.

2 **Ad-aware 5.83** 872KB
Rid your PC of advertising spyware with this freeware utility.

3 **BIOS Wizard** 166KB
Tweak your BIOS settings from within Windows.

4 **Netscape 7 PR1** 30MB
Netscape's latest browser features multiple windows, tabs, and AOL Instant Messenger.

5 **WinSplit 1.0.8** 22KB
Distribute large files over e-mail or on floppy disk by breaking the files into smaller pieces.

PHOTOGRAPH: MARC SIMON

Get Back, Get Flat

Back to school. Back to work. Fall is a great time for an upgrade to the latest in flat screen displays from CTX. A monitor that can handle the detail in everything from spreadsheets and complex documents to presentations and graphics. One that's easy on the eyes as well as easy on space. Take a look at our award-winning family of FlatView™ LCD color monitors. We know you'll be impressed. Their high resolution and active matrix color deliver a clean and crisp display. A stylish profile and small footprint are a perfect fit for office, home, dorm or apartment. Get great features. And a great price, starting at just **$399** (ESP).

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Panel	Active Matrix TFT	Active Matrix TFT	Active Matrix TFT
Resolution	1024 x 768	1280 x 1024	1280 x 1024
Interface	Analog	Analog	Analog/Digital
On-Screen Controls	Yes	Yes	Yes
Brightness (Typical)	200:1	250:1	250:1
Contrast (Typical)	350:1	350:1	500:1
Pivot	Yes	Yes	No
Power Management	TCO '99	TCO '99	TCO '99

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PC MAGAZINE EDITOR'S CHOICE

February 26, 2002
CTX PV720A
CTX International Inc

PC WORLD TOP 10 MONITORS

COMPUTER MAGAZINE TOPSCORER

COMPUTER MAGAZINE VEDETTE

PC ADVISOR

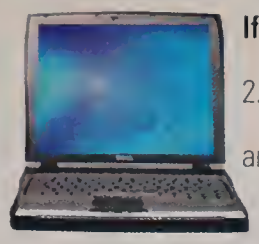
Hardware 1,9

Hardware High-End

Hardware AWARD CTX PV720A

You can never be too thin or too powerful.

But it's nice to have options.



If ultra-thin and ultra-light are your business objectives, check out the NEW Dell Latitude X200. Only 2.8 lbs.[4] and 0.8" thin, it's powered by a new Ultra Low Voltage Mobile Intel® Pentium® III Processor-M at 800MHz and a high capacity lithium ion battery that gives you over five hours of power. Looking for something more? The Latitude C400 is a lightweight powerhouse that weighs only 3.6 lbs.[9] and stands merely an inch thin. It comes with a Mobile Intel® Pentium® III Processor-M at up to 1.20GHz and Enhanced Intel® SpeedStep® technology, so you have the power to work faster and longer. When it comes to thin, light notebooks that are easy to buy and customized to fit your needs, Dell has plenty of options. So go ahead, be choosy.

Ask about 60 DAYS same-as-cash for qualified customers[30]

***CNET* Editor's Choice**
Latitude C400 Notebook
– March 2002

Dell | Small Business

Latitude™ C510 Notebook

NEW Small Business Value Notebook
- Intel® Celeron® Processor at 1.06GHz
- 14.1" XGA Active Matrix Display
- 128MB PC133 SDRAM
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- 16MB DDR AGP 4X ATI® Radeon™ Video
- Modular 24x Max CD-ROM/Floppy Drive
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E-VALUE Code: 12732-S70811

Recommended upgrades:
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Latitude™ X200 Notebook

Thinnest, Lightest Latitude Notebook
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- 256MB shared[60] PC133 SDRAM
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- Intel® 830M Integrated Graphics up to 48MB (shared[60]) SDRAM
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- Windows® XP Professional; External 24x CD-ROM
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Recommended upgrades:
- X200 Media Base, FDD, 24x Max/10x Min CD-ROM, add $299
- 3-Yr CompleteCare™ Service,[20] add $169

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Network-Optimized Mobility Notebook
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- Modular 24x Max CD-ROM/Floppy Drive
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VALUE

USER ALERT

KLEZ: THE VIRUS THAT WON'T DIE

ALREADY THE MOST PROLIFIC VIRUS EVER, KLEZ CONTINUES TO WREAK HAVOC.

THE KLEZ WORM is approaching its seventh month of wriggling across the Web, making it one of the most persistent viruses ever. And experts warn that it may be a harbinger of new viruses that use a combination of pernicious approaches to go from PC to PC.

Antivirus software makers Symantec and McAfee both report more than 2000 new infections daily, with no sign of letup at press time. The British security firm MessageLabs estimates that 1 in every 300 e-mail messages holds a variation of the Klez virus, and says that Klez has already surpassed last summer's SirCam as the most prolific virus ever.

And some newer Klez variants aren't merely nuisances —they can carry other viruses in them that corrupt your data.

HOW IT WORKS

KLEZ IS AN example of a blended threat: software that distributes itself like a virus but sometimes behaves like a worm and at other times like a Trojan horse. (Go to find.pcworld.com/30140 for more on different virus types.)

Klez usually arrives in the in-boxes of unsuspecting victims as a file attachment. It uses various subject lines, including "Klez removal tool". (For the real tool, visit find.pcworld.com/30128.) Some variants also draw subject lines from random words in files on a victim's hard drive.

When the victim double-clicks the attachment, or even just previews the message, the fun begins for Klez. It pilfers addresses from the victim's e-mail address books, and also searches the hard drive for addresses from the Web browser cache or temporary files.

What makes Klez particularly insidious is that it draws both a new sender and a new recipient from the infected party's sources. This creates at least three victims: the person who first got the worm, the one who is sent the worm, and the one whose address was taken from the original victim and is used as the new sender (see "Klez's Path of Infection").

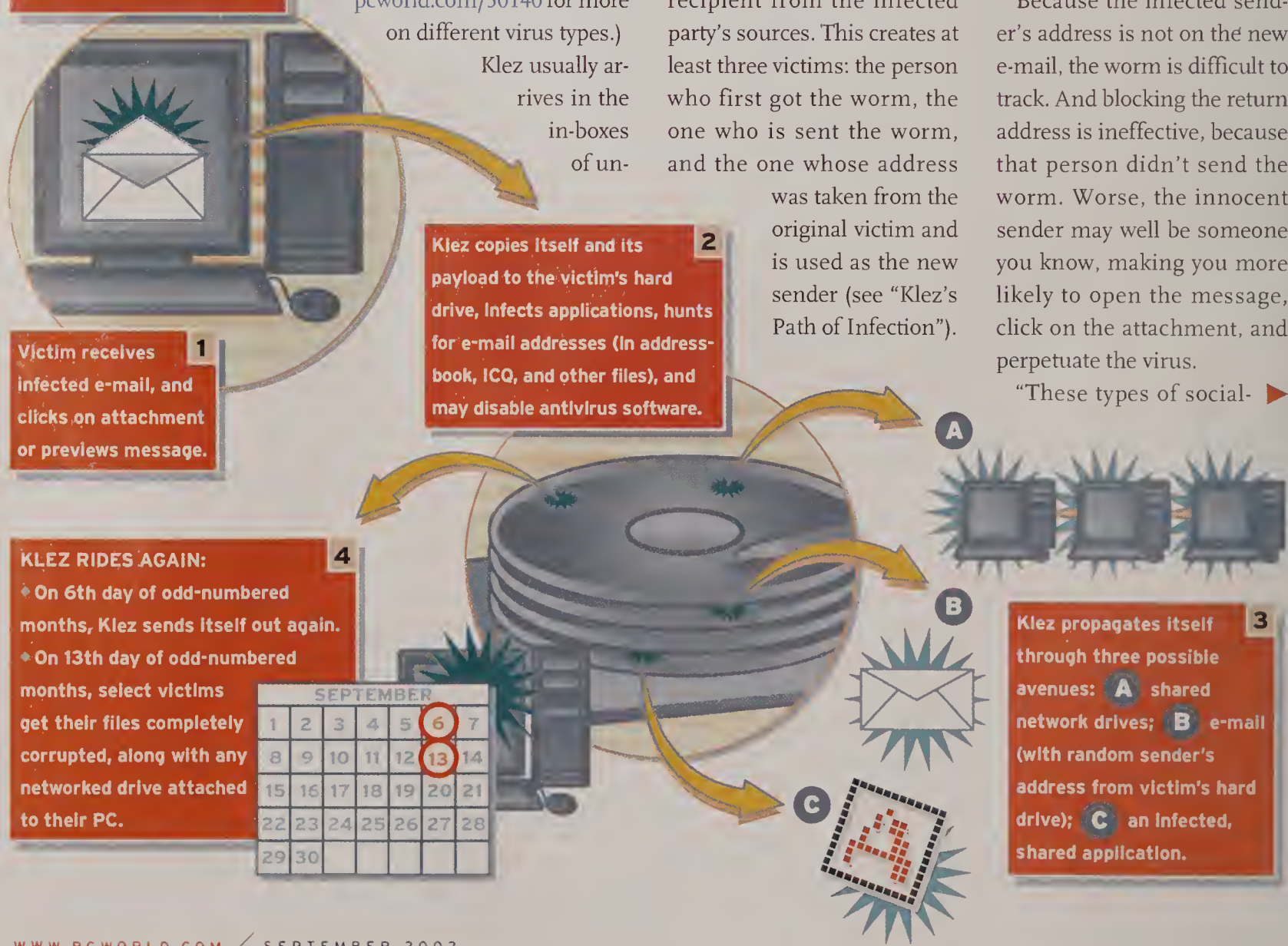
SAFETY TIPS

- Regularly update your antivirus software.
- Install the latest IE and Outlook/Outlook Express security patches (find.pcworld.com/30134).
- Look for messages with attachments that range in size between 110KB and 150KB.
- Watch for odd subject lines that are atypical of those you normally receive.
- Use a product such as SpamKiller (find.pcworld.com/27424) to screen your mail and make deleting suspicious notes easier.

Because the infected sender's address is not on the new e-mail, the worm is difficult to track. And blocking the return address is ineffective, because that person didn't send the worm. Worse, the innocent sender may well be someone you know, making you more likely to open the message, click on the attachment, and perpetuate the virus.

"These types of social- ▶

Klez's Path of Infection



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engineering tricks are extremely effective," says virus researcher Sarah Gordon. People don't want to ignore a friend or colleague, she says. "They feel compelled to look at an attachment—even though they've heard the warning."

In the months since Klez was first identified, antivirus vendors have discovered seven versions of the virus. These strains share many behavioral traits but act slightly differently from one another. For example, some later versions can attack other systems over networks by copying infected files to file servers and shared hard drives. One of the newest variants, W32.Klez.H@mm, contains another worm called ElKern that can damage an operating system beyond repair. In some instances, users must reformat the entire hard drive and reinstall Windows to purge the virus from a PC.

CAN YOU FIGHT BACK?

WITH THESE types of blended threats, it's not enough just to update your antivirus software's data definitions regularly; you need comprehensive security protection, including both privacy and intrusion protection, according to Vincent Weafer, senior director of Symantec Security Response. Users who also make it a habit to install new security patches are better equipped to defend their PCs against the kinds of worms that attack well-known Windows weaknesses.

But even if you take all appropriate measures, others who have your e-mail address in their books may not. You won't get the worm, but you will still get neutralized and irritating notes in your in-box.

There's little you can do to prevent such e-mail from reaching you; however, your ISP may be able to help. Some ISPs use so-called antivirus appliances that are capable of filtering millions of messages and stopping infected ones from getting to your in-box.

But ultimately, each of us who uses a PC is responsible, in a small way, for preserving our neighbors' security—by keeping our own PC clean.

—Andrew Brandt

INK JETS

EPSON'S MAGNIFICENT SEVEN

THE STYLUS PHOTO 2200 PRINTS IN SEVEN COLORS, ONE-UPPING THE COMPETITION.

USING SEVEN different color inks, the $699 Epson Stylus Photo 2200 raises the bar for high-end ink jet photo printers. Epson adds "light black" (should that be "gray"?) to the cyan, light cyan, magenta, light magenta, yellow, and black inks offered in many quality photo printers. This enhances contrast and gradations, so even monochrome photos look great.

The 2200 also is the first printer that employs Epson's pigment-based UltraChrome inks, which produce a wider color range on a greater variety of papers than dye-based inks do. In addition, UltraChrome inks should be less prone to fading in bright light (though Epson's claims about their archival properties seem to be less optimistic than some made for previous inks).

Epson now supplies individual ink cartridges, so you can replace one color at a time as it runs out, or you can swap two types of black ink—one for glossy paper and a second for matte.

In addition, the 2200 uses Epson's Print Image Matching (PIM) technology, which optimizes prints of photos taken with compatible cameras from major vendors.

The 2200's 2880-by-1440-dots-per-inch resolution is four times more precise than that of its predecessor, the Epson Stylus Photo 2000P, and equal to that of the cheaper (and newer) dye-based Stylus Photo 1280. My production-level 2200 delivered brighter colors and better detail than the 1280 did. A high-quality 8-by-10-inch color print took more than 9 minutes—slow, but still faster than most photo printers.

The 2200 produces prints up to 13 inches wide. An automatic roll-paper cutter enables you to print a complete batch of photos unattended. The printer can support FireWire (IEEE 1394), USB 1.1 and 2.0, and parallel connections.

Casual photographers and hobbyists can do quite nicely with a sub-$200 model, but for professionals the 2200 represents the state of ink jet art.

—Paul Jasper ▶

UPSCALE INK JET: The Stylus Photo 2200's seven colors produce superior prints—for $699.

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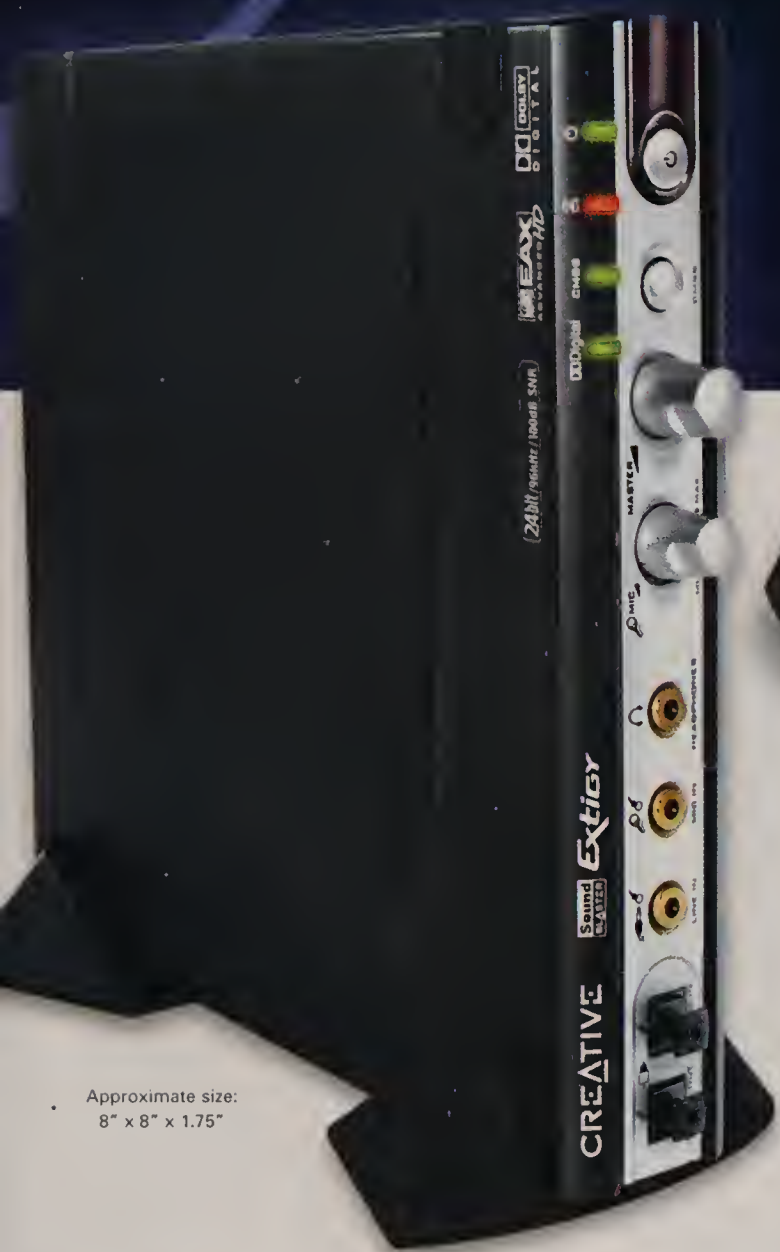

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THE 2-INCH-WIDE parallel ATA ribbon cables in your PC are as familiar as the old pair of sneakers in your closet. But like the soles on those shoes, parallel ATA is wearing thin, having hit its data-transfer-rate limit of 133MB per second.

Enter Serial ATA, the successor technology we examined on a prototype hard drive from Seagate. Debuting with a speed of 150 MBps and having the potential to scale up to 600 MBps, Serial ATA provides the headroom needed for faster drives in the future. And because it uses 3-volt (instead of 5-volt) signals, it will work better with the low-power motherboard chip sets and CPUs coming soon.

Unlike parallel ATA drives, the serial model we installed in our Windows 2000 test system required no master or slave designation. We simply plugged one end of the 0.25-inch cable into the drive and the other into a supplied Silicon Image Serial ATA card that we plugged into a PCI slot. (The thin cable also permits better airflow and more-compact system designs.)

Seagate will offer its Serial ATA drive this fall. Maxtor and Western Digital promise to provide the interface on some drives by year's end—about when Via expects to integrate it into PC chip sets. Intel plans to follow suit in 2003.

Users also have new capacities to look forward to, thanks to an increase in drive-platter areal density from 40GB to 60GB. With two platters, Seagate's Barracuda ATA V will hold 120GB. Western Digital's new Caviar model should reach 200GB. Later this fall, look for both Maxtor and IBM to launch their own ultrahigh-capacity products as well. (See our hard drives buyers' guide on page 102 for more.)

—*Seán Captain*

SERIAL ATA drives offer faster throughput and slimmer cables.

ETHERNET

GIGABIT NETS FOR SMALL BUSINESS

1000-MBPS NETS COME TO DESKTOPS.

GIGABIT NETWORKING over copper wiring has been available since 1999, but until very recently, high costs placed it beyond the reach of small and midsize businesses (and advanced home networkers).

Now, gigabit ethernet controllers are starting to appear on PC motherboards, notably the one inside Dell's new OptiPlex GX260. And Linksys has introduced its first line of products aimed at smaller businesses that want to upgrade their PCs and network switches to the 1000-mbps (1-gbps) standard. Though prices are still fairly high, users who work with large data sets (such as enterprise-level databases) or stream video over a network should consider it.

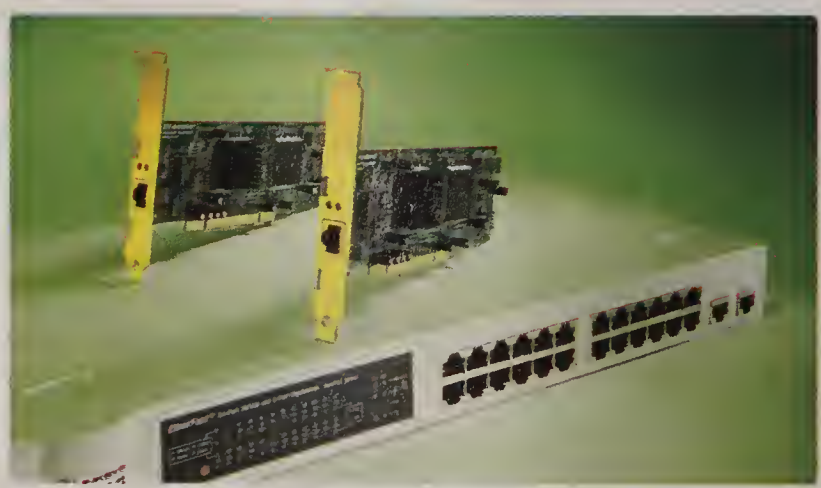
We tested Linksys's $499 EF24G2 EtherFast Dual Gigabit Switch—which offers a pair of 1000-mbps ports and 24 10/100 ports—along with the same company's $75, 32-bit EG1032 Instant Gigabit Network Adapters on a small-office peer-to-peer network.

In prior informal tests on a 100Base TX network, upload speeds averaged 80 mbps, and download speeds averaged 92 mbps. With the gigabit network, upload speeds increased by 75 percent, and download speeds by 84 percent.

According to industry studies, this result matches that of similarly configured small networks. Linksys says PCs with a faster frontside bus than those used in our tests (133 MHz for a 1-GHz Pentium III PC and 66 MHz for a 500-MHz PIII unit) should achieve better performance. You'll also see boosts on the back end to and from a server.

A 75 percent performance gain is certainly worthwhile, but small offices using peer-to-peer networks may want to wait for further price drops and for switches with more than two 1000-mbps ports.

—*Ramon G. McLeod* ■



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PHOTOGRAPHS: MARC SIMON

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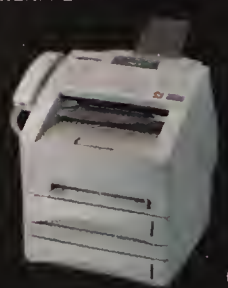

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LETTERS

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TALLYING UP THE COST OF SPAM | READER'S BROWSER HIJACKED | ALIENS IN NEW MEXICO

PROTECT YOUR PC

AFTER DUE consideration, it will be fine with me if Robert Luhn and Scott Spanbauer ["Protect Your PC," July] date any two of my three younger sisters. They are currently married...but I will handle that.

The sections on antivirus software (Luhn) and firewalls (Spanbauer) were extremely well done and exactly the type of effort that sets your organization apart—concise, objective, with evaluation criteria that actually relate to the intended use of the software (I am not interested in sartorial counseling or the author's opinion on his olfactory experience when opening the box) and a broad sampling of competitive products. Great work, and thank you!

Robert Erickson, San Francisco

WOW, ARE YOU folks right on about your Best Buy antispam utility, McAfee.com SpamKiller version 2.87 [find.pcworld.com/27424]! I downloaded the trial version. It took me only two days to realize that it was something I couldn't live without, and I immediately bought it. The program did take a little tweaking to set up correctly (I had to devise a workaround to get my e-mail mailing list imported). One nice thing is that you can view the "killed files" to see if anything important is in them. SpamKiller's standard filters work flawlessly and are updated automatically with the click of a button. This one piece of advice from you has paid for my subscription tenfold.

Roy Gursky, Brentwood, California

WHILE WE WERE thrilled that PestPatrol 3.1 was included in "Protect Your PC" as a stealthware-finding utility, we'd like to add that PestPatrol finds so much more than just spyware. In fact, it detects and deletes more than 40,000 different pests, including Trojan horses, zombie agents for denial-of-service attacks, and many kinds of hacker tools, as well as the spyware and adware you discussed.

Barb Rose, Director of Communications
PestPatrol, Inc.

I WOULD LIKE to mention an alternative to all the mainstream antivirus packages that typically get reviewed. I have been using AVG antivirus software from Grisoft (www.grisoft.com) for about a year and a half and have been very pleased with its quality. It has worked seamlessly within both Windows Me and XP, and I highly recommend it.

In addition to no-cost regular updates, it offers scheduled downloads and testing, e-mail integration, heuristics testing, and shell integration (for use with download agents). I particularly enjoy the virus vault, which archives all the failed attempts to infect my system. And it is visually appealing and completely free.

Gavin S. Smith, Philadelphia

PC WORLD'S 20TH WORLD CLASS AWARDS

I ENJOYED READING the article on the best products of 2002 in the July issue. It was very insightful and you had good remarks. I would suggest, however, that next year you put in more budget-priced items. Most people don't have the money for top-of-the-line products and want the best bang for the buck.

Matt Wendig, via the Internet

YOUR JULY ISSUE is a gem. I have used Google [Product of the Year and Best Search Engine] since it came out, and I rank it as you do. The same for ZoneAlarm Pro [Best Firewall] and Ad-aware [Software Product of the Year]. I am quite happy to have paid for both.

Mark Economos, Scarsdale, New York ▶

LETTER OF THE MONTH

Opting Out Is Asking for More

IN THE ARTICLE "Finally, Real Relief From Spam" [*Web Savvy*, July], Brad Grimes mentions that he opts out of spam from the "legitimate" marketers. I would have to classify that practice as being about as wise as clicking the "remove me" link in most spam. There really is no way you can know in advance whether such opt-out options will work as promised. Your e-mail address may still be added to the lists of an e-mail marketing business.

On average, my Hotmail account has received about 15 spam messages a day. I traced the spam and started contacting ISPs and hosts. When nothing was done, I e-mailed more aggressive letters, including threats to contact the FTC. Within a month of my doing this, spam went down to about 5 or fewer a day. I then tried the opt-out method. Currently my spam has increased to an average of 35+ a day. And I have not even signed up with any Web sites using this e-mail account.

Nicholas P. Hillebran, Amelia, Louisiana

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CONGRATULATIONS on your 20th World Class Awards. As I do every year, I enjoyed their arrival. However, you awarded Best Operating System to an entrant that "can go for weeks without crashing." News flash: Operating systems are not supposed to crash.

One that doesn't, and the one I use: Linux. With the latest graphical desktop environments currently available, I'll never need to go back to Windows, nor do I want to. And my total cost? Zero.

Joe Davis, Minneapolis

YOU PICKED Pegasus Mail 4 as the best e-mail software, referring to its "Powerful and intuitive mail-filtering rules."

I disagree with the "intuitive" part, not on mail-filter rules but on overall ease of use. In Outlook, you can right-click any folder and create, rename, or delete subfolders. You can right-click on messages and delete them. Not in Pegasus.

Instead of Pegasus or Outlook, I prefer Eudora (my company also prefers it over Outlook for security reasons). Eudora is easier to navigate and much more intuitive than Pegasus. In Eudora, I can perform with one or two mouse clicks tasks that in Pegasus take three or more mouse clicks to do. Also, Eudora has better third-party e-mail import tools than Pegasus, which does not have any.

Mario Chávez, New York

BROWSER HIJACKING

THANKS TO Tom Spring for the online article "Has Your Browser Been Hijacked Lately?" [find.pcworld.com/30066].

Yes, my PC was "hijacked" by Lop.com —that is, my browser's home page was involuntarily redirected to this adware site, as described in the article. Too bad I did not read it 2 hours earlier—I had just finished reformatting my hard drive and reinstalling my operating system to get rid of the stealth crap! Your site's article pointed to the information necessary to remove the program.

Reddex Washington, via the Internet

Editor's note: For Tom Spring's broader look at abusive online marketing tactics (including browser or home-page hijacking), see *News and Trends*, page 24.

NETWORKING = HEADACHES

I LIKE STEPHEN MANES'S tongue-in-cheek style ["Networking: You Still Need a Geek," *Full Disclosure*, July]. His is usually one of the first articles I read each month. This particular piece really hit home, as I am a professional in the area of system setup and installation, including home networking setups. I find that the things that can (and will) go wrong in a networking setup are ridiculous and not necessarily repeatable. What should happen doesn't, and vice versa.

Don Ward, Ijamsville, Maryland

MORE ON THE TIPS ISSUE

JUNE'S "How to Print Perfect Photographs" recommended saving pictures in TIFF format (as .tif files).

I have taken around 15,000 digital pictures and have saved only about a dozen as .tif files. The reason is simple: A .tif file is *huge*, requires a massive amount of space, is difficult to deal with (because of its sheer size), and is rarely needed. ▶

CORRECTIONS

IN AUGUST'S "Best of Today's Web," we incorrectly listed the URL for MSN's Money Central. It should have appeared as moneycentral.msn.com.

In July's *Top 15 Notebooks*, a photo caption should have identified the notebook shown above it as the Toshiba Satellite 5105-S607.

In July's "Drag 'n' Drop to CD-RW Easily" (*News and Trends*), we should have said that the new standard code-named Mt. Rainier is also known as EasyWrite, not Easy Writer.

In July's "Stop Stealthware" (part of "Protect Your PC"), we should have indicated that, as explained at the Eudora Web site (find.pcworld.com/30068), spyware scanners flag the sponsored version of Qualcomm's Eudora e-mail application because its AdCache folder coincidentally has the same name as a folder that exists in some stealthware.

PC World regrets the errors.

Karen (and the rest of our team) would be happy to help you configure your Anthro Workstation.

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*All salary information is based on the *Occupational Outlook Handbook*, a publication of the U.S. Department of Labor. Individual student earnings vary.

**Growth figures represent a ten-year period ending 2010. Source: *National Industry-Occupation Employment Matrix*, a publication of the U.S. Bureau of Labor Statistics.

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Dennis Baker, Lake Orion, Michigan

HEY, GUYS, take it easy on Roswell ["How to Solve the Weirdest PC Mysteries," June]. Just because we had an alien ship crash here does not mean that we are all aliens. (From a proud nonalien Roswellite and novice computer user.)

Bill Meaders, Roswell, New Mexico

OF ALL THE ISSUES of *PC World* I have read over the years, the June "Ultimate How-To Guide" is without a doubt the finest ever. Keep up the great work.

Marty Resnick, via the Internet

A MATTER OF TASTE

KEYBOARD CHOICES have a lot to do with personal taste and comfort. Recent columns on keyboards [*Home Office*, July, and *Full Disclosure*, May] both fail to mention Logitech products.

Logitech makes wonderful cordless keyboards and mice. I use the Cordless Freedom Pro. It is very comfortable, and I can take it with me outdoors or downstairs and control my speakers from a location far from my computer.

In addition, the mouse driver software has a "Web wheel" function that can be configured for speedy surfing. Logitech updates its drivers frequently on its Web site (www.logitech.com).

Even if the keyboard/mouse set were priced at $300, it would still be my choice for elegance and ergonomic comfort.

Linda Tiet, Edmonton, Alberta

THE COLOR OF THE MARKET?

THE STOCK MARKET has plunged, hitting the tech and PC stocks hardest—and (coincidentally?) Gateway, Dell, and others changed their PCs from beige to black and platinum colors.

The successful giants of merchandising—such as General Electric—chose vivid white for stoves, refrigerators, and washing machines, because white is bright and right; it's what customers want.

Black, on the other hand, is the color of death, funeral homes, and nighttime. Maybe the PC sellers are right. Maybe black *is* appropriate these days.

But I prefer white.

Edward Tottle, via the Internet

THE REAL COST OF SPAM

I FOUND YOUR August article "Spam Inc." interesting, but totally lacking in tallying the real cost of spam.

As a mechanical engineering firm, we make a living by spending as much time as possible actually working on engineering projects. For us, e-mail is a valuable and necessary tool. However, having to wade through 50 to 100 e-mail messages to make sure that a key client isn't ignored costs us hundreds if not thousands of dollars a year.

At $120/hour (to make the math easy), our time is worth $2 per minute. Let's say I spend 2 minutes per day dealing with spam, 200 days a year. That is $400 per year, per engineer. With eight engineers, the annual cost would be $3200!

This is a real expense, seen by every business that uses e-mail. This doesn't include the cost of disabling "crippled" e-mail addresses and creating new "clean" addresses that then have to be forwarded to hundreds of business contacts.

Marcus H. Wilcox,
Walla Walla, Washington

I'M HAVING TROUBLE understanding all the fuss about spam. I don't like it, but I have the same feelings about other kinds of unsolicited advertisements, such as those listed below. What are we going to do about *them*?

- Radio advertisements
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- Snail-mail junk
- Telemarketers' calls
- TV commercials
- And (last but not least) magazine ads

Dick Jimmo, via the Internet

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- Inspiron Notebooks shown here include 1-Yr Limited Warranty,* 1-Yr Mail-In Service

Dell | Solutions

Software and Peripherals

Desktop:
- Epson® Stylus® C80 Color Printer (Color-Matched to System), $149
- Lexmark™ X83 Multi-Function (Prints, Scans, Copies, and Faxes), $169
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- Canon® PowerShot™ A200, $199

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Where Have All the PC Makers Gone?

The consolidation of the PC market could be bad news for consumers.

ILLUSTRATION: PJ LOUGHRAN

IT'S BEEN A FEW years since I bought my last PC. I'm looking for a new one, but getting back into the market is like attending tribal council during the last few weeks of *Survivor*. Where is everybody?

Three years ago, the number of computer makers aggressively vying for your desktop—from giants like Dell, HP, and IBM and second-tier vendors like Acer, NEC, and Toshiba to lesser-known little guys like Axis, MidWest Micro, and Premio—was almost overwhelming.

Fast-forward to today. I recently hit the Web to comparison-shop for a Pentium 4 system. Six searches and several different price-comparison engines later, my list totaled a scant five vendors: Dell, Gateway, HP/Compaq, IBM, and Sony. My local retail stores didn't fare much better, offering most of the same brands, plus a few smaller players and one or two of the stores' own varieties.

Sure, you can find other manufacturers out there. But such companies as CyberMax, Packard Bell, and Quantex have gone belly-up in the past few years, while other PC vendors have been acquired, merged with other companies, or shifted their business model in pursuit of more-profitable pastures. All in all, there's no denying that the PC marketplace has undergone some seriously Darwinian economic pressures in the past few years.

One of the most significant and controversial corporate mergers occurred last May, when two of the computer industry's biggest names, Hewlett-Packard and Compaq, joined forces. After months of corporate wrangling, political infighting, and intense courtroom dramatics, the pair finally staggered to the altar and became the "new HP" (for further information on the merger, see our news story at find.pcworld.com/30149). Although the company plans to continue marketing products under both the HP and Compaq brand names, the merger effectively removes yet another player from an industry that's already seen more shrinkage than George Costanza of *Seinfeld*.

PC manufacturing is not the only market to feel the squeeze. The floundering Internet services industry has been the poster child of corporate consolidation, as we have seen all too often during the dot-com implosion. The financial struggles of broadband provider companies like Rhythms and Covad, along with the dozens of fledgling and established Internet service providers that have been snapped up by behemoths like EarthLink, have also helped create a chaotic—and smaller—technology marketplace.

And don't get me started on the software marketplace, in which so many of the product categories are now dominated by one or two corporate giants.

Of course, there are lots of econom- ▶

ic reasons why the big are getting gigantic and the little guys are fading away. Mergers are often justified by terms like "economies of scale" or "synergy." And in the technology field, as in many other parts of American corporate life these days, it's increasingly difficult to survive with only a modest market share.

But what does all this corporate jockeying mean for PC buyers? Let's start with the bad news. The most obvious effect of a consolidated market is that customers

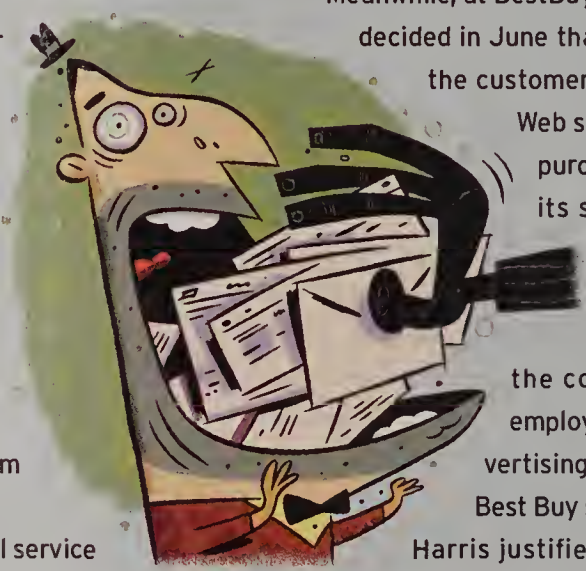
PRIVACY WATCH

Just Say 'No' to Spam—Again

POP QUIZ: When are reading a Web site's privacy policy and declining to receive spam or to share your personal information not enough to protect your privacy? Answer: When the site suddenly changes its policy-and your choices.

That kind of switcheroo has been happening a lot lately. Privacy policy changes have left legions of users of BestBuy.com, EBay, Hotmail, and Yahoo Mail struggling to sort through a thicket of options to avoid junk mail.

Yahoo Mail, for instance, replaced a single check box in which users could decline to receive e-mail ads with a series of more than a dozen radio buttons that were all set by default to include users in spam mailing lists.



MSN's free Hotmail service should receive some credit for swimming against the tide. Hotmail altered its privacy policy to give users more options for keeping their information out of marketers' hands. But if you signed up for the service before March 2002, you must revisit the site to protect your data (e-mail address, birth date, zip code, gender, and occupation). For instructions on protecting your privacy at Yahoo Mail and Hotmail, see *Internet Tips*, page 162.

Have you checked your EBay privacy settings lately? In February, the online auction house changed its privacy policy to reserve the right to reveal anything about you to nearly anyone. EBay requires registered users to pony up a real mailing address and telephone number, not just an e-mail address. That policy means that EBay and its partners can harass you not only through your in-box, but also by snail mail and over the telephone.

Click *My eBay* and the *Preferences* link, followed by *Change My Notification Preferences*, to get to the page where you can opt out of telemarketing calls and junk mail. Also, be sure to scroll down and pay particular attention to the *Other Emails* and *Other Contacts* sections.

Meanwhile, at BestBuy.com, the retailer decided in June that it would merge the customer databases of its Web site users with the purchasing history of its store customers, thereby creating a massive database that the company plans to employ for targeting advertising to each user.

Best Buy spokesperson Joy Harris justifies the company's change this way: "As a shopper myself, it makes no difference to me where [retailers] keep [customer databases] or how they merge them.

"You have to assume they have customer information about [you]," Harris says, "and who cares?"

Well, I care, Joy, as do millions of other people besieged by spam and ads on their computers. The lesson: The price of privacy is eternal vigilance. Whether you register to use a free online service or you purchase something from an online store, don't neglect to check your account's privacy settings periodically to ensure that the site hasn't suddenly "given you an opportunity to receive marketing offers."

—Andrew Brandt

ILLUSTRATION: HARRY CAMPBELL

have fewer brands to choose from. That can be frustrating for those of us who like to shop around or who prefer to do business with smaller companies. Also, fewer vendors generally means fewer offerings on the shelf, leaving many consumers to wonder whether they'll be able to find the products or services they want—and how much those items will cost.

Another likely casualty of a consolidated personal computer market is technological advancement.

Shane Rau, an analyst at market research firm IDC, explains, "If there are fewer PC makers competing with each other, there's less incentive to innovate. So at least in the short term, consumers end up seeing fewer features and a slower pace of technological innovation."

What about prices? A highly competitive marketplace can lead to price wars as companies duke it out by slashing their prices. And clearly we've seen some incredible bargains as PC makers have bet the bank to grab market share.

PRICE TRUCE

BUT WITH FEWER competing vendors around, the bargain basement may have bottomed out. According to Gartner analyst Martin Reynolds, consumers should not expect PC prices to drop much lower than they already have.

"Prices are aggressively low already, and there isn't a lot of room for manufacturers to cut," Reynolds explains. "The competition has been a bit too intense, as manufacturers lose money to make money—hence the amazing deals that sometimes pop up."

In fact, Reynolds theorizes, the HP-Compaq merger could actually prompt a slight PC price increase. "Consolidation happens because there are too many players and they can't make money. So as they disappear, prices will naturally rise a little bit—but only to [reasonable] levels. Sony, Dell, and Gateway will see that the price ceiling remains in place."

On the other hand, Reynolds doesn't see any of the remaining PC vendors calling it quits anytime soon.

"The market is served by a few well-differentiated players," he says. "HP [appeals to] the mass market, while Gateway focuses on midrange and semiprofessional users. Dell goes after more-knowledgeable types, and Sony is leveraging its [superior] brand [name recognition]. So there are no obvious candidates for removal from the market," he concludes.

That's good news for buyers, because the PC market is moving toward a more stable balance, IDC's Rau says.

When there are too many manufacturers, customers can never be sure whether the company they buy from today will be filing for bankruptcy tomorrow. Conversely, when there are too few companies making PCs, those vendors can demand inflated prices, Rau explains.

PLAYING A SMALLER FIELD

IF YOU ARE PLANNING to make a PC purchase soon, here are a few things to look out for before you buy:

Ride the waves of competition. Big manufacturers like Dell, Gateway, and HP will still try to lure customers with offers of free shipping or discounts on machines that don't have the absolute latest equipment. Consumers who are flexible about specifications and timing have a great advantage. Know what you want, and be patient enough to wait for a deal.

Cast your net wide. You'll find many more choices on the Web than you will at retail stores. Consider offerings from smaller vendors and "white box" makers (companies that build generic-looking PCs with off-the-shelf parts), but be careful.

Compare each component offered by an unknown vendor against those of an established one and make sure you're getting name-brand parts. Also, carefully check the details of the service and support policy and warranty—a computer with a great price isn't a good deal if the company won't stand behind it.

Consider buying local. Our survey late last year on PC reliability and service found that most customers of local "mom-and-pop" computer stores were extremely happy with the service they received. On average, reliability of the locally built machines was solid, but not stellar.

Ask friends for recommendations before you buy from a mom-and-pop, ▶

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and look for a store that's been in business at least five years and is a short drive from your home or business. For more information and tips on choosing a local shop, go to find.pcworld.com/29780.

Follow the money. You don't want to be the last person to buy a system from XYZ Computers before it shuts the doors and starts blaming the auditors. So it makes sense to check the financial news before you make a purchase. If a company appears to be on the ropes, consider buying a comparable PC from someone else.

Anyone who buys an operating system or office suite knows what it's like to have only one or two viable choices. Let's hope that the PC hardware market continues to foster healthy competition. ■

Anne Kandra is a contributing editor, Grace Aquino an associate editor, and Andrew Brandt a senior associate editor for PC World. *Address e-mail to any of these three at consumerwatch@pcworld.com.*

ON YOUR SIDE

Web Glitch Causes Duplicate Charges

I PLACED AN ORDER for a cell phone on Sprint PCS's Web site. After I entered my credit card number, a JavaScript error popped up. I didn't proceed with the online transaction. Instead, I immediately called a Sprint PCS sales representative, who assured me I wouldn't be charged if I did not receive a confirmation number. I then placed the order over the phone. I received one cell phone, but my credit card bill showed two charges for it, presumably one for the Internet transaction and one for the phone transaction.

After failing to resolve the problem with Sprint, I disputed one of the charges for $521 with my credit card company, which issued me a refund while investigating the problem. Weeks later, Sprint PCS again charged me $521, and then disconnected my phone service altogether. After multiple attempts to resolve the issue, hours on hold, and faxing my credit card statement half a dozen times, I've been unable to get my money back. Please help.

Adam Glick, Littleton, Colorado

***PC World* responds:** I contacted Sprint PCS on Glick's behalf. According to a company spokesperson, Sprint PCS cannot comment on the situation because of its customer privacy policy. Glick said that a Sprint representative recently contacted him about his refund issue, asking him to refax his credit card statement. According to Glick, Sprint PCS then offered him a full refund for all the disputed charges, including the cost of the cell phone, and reactivated his wireless phone service.

—Grace Aquino

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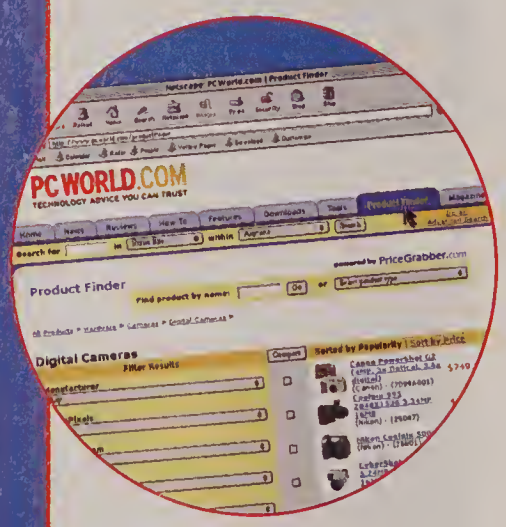

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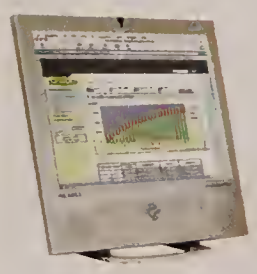
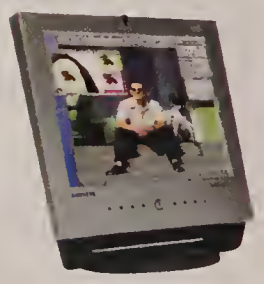


151MP



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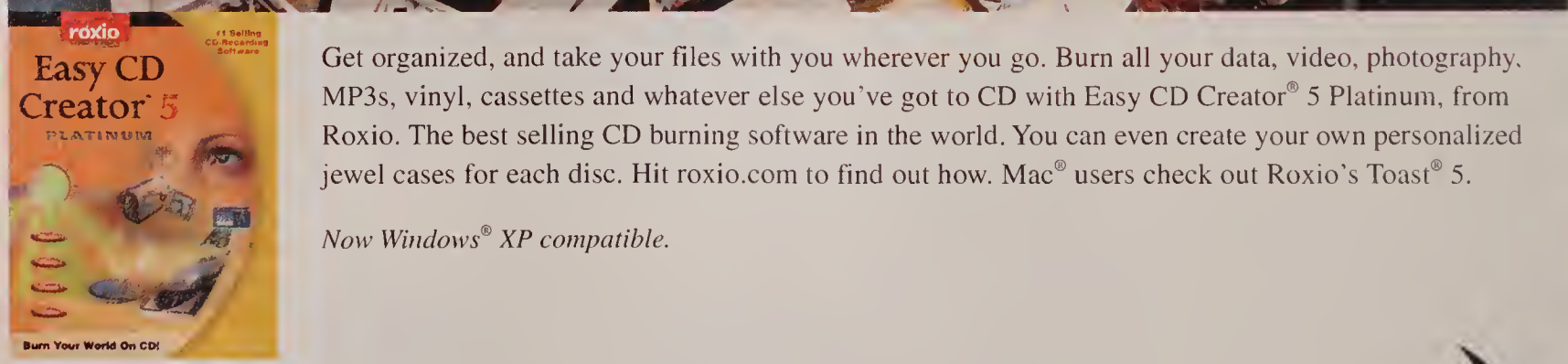

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WEB SAVVY

BRAD GRIMES

Give Your Browser Special Powers

Miniature JavaScripts can enhance Web surfing—if you're careful.

IT NEVER OCCURRED to me that the macro-style scripting I've used to speed up common word processing and spreadsheet tasks might be possible within Web browsers. Then I caught wind of something called a bookmarklet, a combination bookmark and JavaScript that you run from your Favorites menu or a Web page to help speed up surfing chores. Bookmarklets are great for power searching, navigating Web pages, and (for those who enjoy it) Web page design. Will they change the way you use the Web? Not radically, but they can be convenient.

A bookmarklet is essentially a Web link, but instead of a URL, the link contains a short piece of JavaScript. You can try one out simply by clicking it, or you can add the bookmarklet to your Favorites menu by right-clicking the link. Because most Web browsers support JavaScript, you can usually use them in any browser.

I've tried a number of cool and useful bookmarklets. One (available at find.pcworld.com/29744) lets me find out, with a single click, who owns the Web domain I'm visiting. The bookmarklet itself simply automates the job of searching VeriSign's Whois database. Another bookmarklet (find.pcworld.com/29745) instantly displays the cookies stored by the Web page I'm currently viewing. And a third (find.pcworld.com/29761) lets me highlight words on a Web page and dump them into a variety of search engines automatically. None of this is sliced bread, but a few practical bookmarklets can really make Web surfing better.

To start using these tools, try www.bookmarklets.com, a site operated by Steve Kangas (who's widely regarded as the inventor of the term "bookmarklet"), or check out find.pcworld.com/30065.

PROCEED WITH CAUTION

BUT ARE BOOKMARKLETS safe? Good question, considering the potential security dangers of running JavaScript. When I try to add a bookmarklet to my Favorites menu, Internet Explorer 5.*x* warns me that it might be unsafe. One bookmarklet I came across reveals passwords that a Web page has remembered but blocked from view. That might be handy at a site where you've forgotten your password (it's safest to follow the site's instructions for getting your password). Still, if a bookmarklet can uncover such information—for good or for bad—there seems to be a risk that another bookmarklet could transmit it to unsavory observers.

Kangas says the chance that a bookmarklet will wreak havoc is relatively slim (you can read his thoughts at find.pcworld.com/30062). For one thing, bookmarkable URLs have a maximum length (just a couple lines of code), which limits what a malicious programmer might do. In addition, you can always see a bookmarklet's underlying code—though that offers little help to people who can't read JavaScript. But longer bookmarklets could be coming, with increased chances they could do harm. In short, while there's little current danger in bookmarklets, you should still be careful when working with them. Learn what you can about the source of each bookmarklet before you bookmark it. ■

Contact PC World *Contributing Editor Brad Grimes at websavvy@pcworld.com.*

GIMME FIVE

Essential Download Sites

1. **WebAttack.com:** Bad name, excellent source of Internet utilities. Includes helpful tips and tricks, plus visual demonstrations of software. www.webattack.com
2. **VersionTracker.com:** Up-to-date shareware utilities, drivers, software upgrades, and more. It's easy to find things at this fairly fast site. www.versiontracker.com
3. **Tucows:** This site has become more cluttered lately, but it's still a must-visit for anyone looking for commercial and free downloads. www.tucows.com
4. **FindSounds.com:** Part search engine, part download tool, this site is ideal for locating and obtaining all sorts of sound files from the Web. www.findsounds.com
5. **PCWorld.com:** I don't make enough from this column to sway my recommendation. PCWorld.com has a great downloads library. www.pcworld.com/downloads

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STEVE BASS

It Pays to Increase Your Word Power

These add-ons and add-ins give Microsoft's word processor new punch.

WANT TO KNOW what features will be added to the next version of Word? I've been to some non-Microsoft Web sites that showed me. There's a great document format revealer and a powerhouse tool for changing Word's interface, along with other functions that help me work lots more efficiently. Want your own pre-prerelease copy? Read on.

If you're thinking that my inside track is a warez or pirate site, you're wrong. My insight comes from paying attention to the companies that make Word add-ons. I figure that Microsoft will find a way to "reinvent" the best features in these programs for Word's next release. (Yes, I'm bashing Microsoft, but based on past experience, it's a fact.)

REVEALING CODES

I BET MANY of you remember WordPerfect's Reveal Codes, the super feature that lets you see every trace of formatting in a document. For WP users, it's an indispensable tool for finding the bizarre, picayune formatting problems that can turn parts of a document into gibberish. No, Microsoft's halfhearted try at the feature in Word XP doesn't even come close.

One look at the format revealer in Levit & James's $75 CrossEyes add-in, and I was blown away. The program gives you a peek behind the curtain in Word. Click the CrossEyes icon on Word's toolbar to split the screen horizontally into two windows—the document above, and the corresponding text and formatting codes below. You can see tables, sections, field codes, and all character, paragraph, and style formats. The two windows work in harmony—if you move the cursor in either window, you'll go to the corresponding location in the other.

A MORE OPTIONAL WORD

CROSSEYES LETS YOU do more than just view the formatting, however. You can excise misbehaving formats in the code-revealing window, or copy and paste to apply formatting from elsewhere in the document. Heck, you can even enter and edit text in the code window if you want. CrossEyes may be expensive, but it's vital for heavy Word users. It works with Word 97 through Word XP, and with all versions of Windows except 3.1 (which my brother-in-law won't stop using).

Another set of essential Word add-ons has been in my toolbox for going on a decade. They're part of the $30 Woody's Office Power Pack (WOPR) by Woody Leonhard. I've watched as many of WOPR's features ended up in Word. "It's kind of a push-me, pull-you approach to improving Office," Leonhard says. "Microsoft 'borrows' the right-click spell checking from WOPR 6, the Document Map from WOPR 95, and the Word Count toolbar from WOPR 2000, and we build in more tools and must-have features for the next version of WOPR."

One of my favorite utilities in the program is the WOPR Place Bar Customizer, which lets me customize File Open, Save, and other dialog boxes in Office 2000 and XP so they point to where I want to go today. For instance, I rarely use the Desktop and My Network Places shortcuts on the left side of the dialog boxes; the customizer lets me replace them with icons to folders I need to get at quickly. (This and other individual WOPR tools are available separately for $15.)

For a great deal, pick up two books that come with the software CDs—I refer to both (Leonhard cowrote them with Ed Bott) regularly. The first is *Using Office XP*, which comes with WOPR XP. I've seen it discounted on Amazon for about $27. *Using Office 2000* is an even bigger bargain—it has WOPR 2000 and runs about $21. To find them online, enter **que books** and the title in Google's search box.

Want even more Word tools? For a rich source of tweaks and downloads, visit the Microsoft Word MVP site at find.pcworld.com/29742. Now give me your word you'll stop shilly-shallying and boost your productivity with a few of these add-ons. ■

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Contributing Editor Steve Bass is the president of the Pasadena IBM Users Group. Reach him at homeoffice@pcworld.com. Sign up for his online newsletter at find.pcworld/25821.

ILLUSTRATION: JAMES YANG

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BUGS & FIXES

STUART J. JOHNSTON

How to Spot Virus Hoaxes a Mile Off

Bogus warnings can hurt more than real viruses. Here's how to detect them.

A TECH-SAVVY friend recently forwarded an e-mail message to me, warning of a PC virus that antivirus software couldn't detect. The alert said that his PC had been infected and that the virus had already sent itself to everyone in his address book, including me. The virus would lie dormant for two weeks "before damaging the system."

Yow! My friend's message identified jdbgmgr.exe as the infected file and told me to delete it. Bad idea. The executable file in question is actually built into Windows. If you delete it, then some Web sites that rely on Java won't work properly. My friend had fallen for a recent virus hoax.

It's just one of many virus hoaxes making the rounds these days—and they're not going away. In fact, most new hoaxes are merely older ones that have been modified and put back into circulation. In this way, virtually all hoaxes stick around for years. For details about the latest hoaxes, check out McAfee.com's alerts page at find.pcworld.com/29957 or see Symantec's list at find.pcworld.com/29960.

Meanwhile, have you been getting some unusual alerts lately? Here are some tips on how to identify virus hoaxes:

1. Detect the undetectable. Beware of warnings that claim a virus is undetectable. In general, if you keep your antivirus software up-to-date, your system will nab the latest viruses.

2. Study the subject. If the e-mail message's subject line includes words such as "Urgent," "Warning," or even "Virus Alert," it's often a good indication that you're dealing with a hoax. Read the e-mail message with great skepticism, not great urgency.

3. Beware of tech talk. Look out for pseudo-technical discussions on the dangers of the virus. Some hoax messages include pure gobbledygook.

4. Check the sources. To create an aura of credibility, a hoax often quotes a well-known company or agency, such as Microsoft, the Federal Communications Commission, or an antivirus company. Check the Web sites of the sources quoted (or see your antivirus vendor's site). Remember also that Microsoft *never* posts virus alerts via e-mail.

5. Scrutinize the instructions. Beware of messages that insist you delete a file manually. True, at times you should do so, but in the context of the other tip-offs, this instruction should raise a red flag.

6. Don't spread the word. False alerts always urge you to tell everyone you know. Genuine alerts never do. Ignore the instructions, delete the message, and don't alarm everyone on your mailing list.

Stuart J. Johnston is a contributing editor for PC World. ■

GOPHER HOLE IN INTERNET EXPLORER

FINNISH SECURITY FIRM Oy Online Solutions found another security hole in Internet Explorer, versions 5.01 through 6.0. This one affects an outdated feature called Gopher—a protocol that was used for accessing text pages over the Internet before the advent of the World Wide Web. Hardly anyone uses Gopher these days, but IE still includes the capability. Even if you don't use Gopher, a cracker could entice you to click a Web link or open an HTML e-mail that would allow the intruder to take over your PC. At press time there was no sign of a patch, but Microsoft did post a workaround. Visit find.pcworld.com/29963 for details.

IN BRIEF

Yahoo IM Flaw

OLDER versions of Yahoo Messenger have several security holes that could allow bad guys to take over your system. The company has posted a new version that takes care of the flaws. Go to find.pcworld.com/29964 to download and install the update, version 5.0.0.1065.

Patch Gets Patched

MICROSOFT has released an updated version of its MSN Chat control—a part of MSN Messenger—to plug a security hole it didn't fix completely in an earlier update (go to find.pcworld.com/29966 for details about the previous patch). So it's time to download a new fix—whether you grabbed the previous one or not. Sigh. Go to find.pcworld.com/29965 to get the company's revised patch.

BUGGED?

FOUND A hardware or software bug? Tell us about it via e-mail at bugs@pcworld.com.

ILLUSTRATION: ROBERT NEUBECKER

THE SOHO REPORT

TECHNOLOGY that keeps up with your CUSTOMERS

Consumers, thanks to the Internet, are now smarter than many of the small businesses trying to serve them.

Research firms report that consumers are increasingly accepting of digital commerce, despite slow Web sites and buggy transactions. But surprisely few businesses have caught on to the benefits of building customer relationships online.

Terri Murphy, a Chicago, Ill.-based business author and speaker, says there is a growing gap between established small businesses and tech-savvy consumers. Murphy often works with real estate brokers, who tend to be in their late 40s and suffer from various degrees of technophobia.

"We are looking at a new, empowered consumer, someone who's had a GameBoy in his or her hand since childhood," Murphy points out.

Murphy teaches real estate brokers and business entrepreneurs to meet consumers where they are most comfortable, and that place is online. Her seminars and articles encourage business owners to use CRM databases, e-mail, and mail managers to build communities and one-on-one relationships with their clients.

"Most small businesses aren't using technology to nurture their client lists on a regular basis," Murphy explains.

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Printers and Productivity

Consider that the right inkjet printer can be a powerful tool in small office/home office (SOHO) environments. Today's top inkjets offer unparalleled color prints and can produce text that rivals the output from a laser printer. Also, the best inkjets now offer speeds fast enough for busy offices. And, aside from these considerations, innovative ease-of-use features can help bolster productivity.

The Lexmark Z65 Color Jetprinter (www.lexmark.com) is a great choice for SOHO users. With industry-leading resolution in color as well as black and white, graphics-infused documents look exceptional. This workhorse can crank out lengthy black-and-white reports at speeds of up to 21 pages per minute.

The Z65 has a host of features that make printing easier: dual paper trays allow for fast media transition; sensor technology detects the type of media in the front paper tray and automatically adjusts the printer to produce the best-looking output; and automatic cartridge alignment ensures optimal prints without manual adjustment. In addition, the Z65's patented Accu-Feed technology enables it to accommodate the widest array of media—from transparencies to

Continued on page 3

▲**TERRI MURPHY**, a Chicago, Ill.-based business author and speaker, says, "The key to any service is that you're not selling a product so much as you're selling your wisdom and knowledge about that product."

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Continued from page 1

envelopes—without jamming.

At $199, everyone in a small office can have a Z65 on his or her desk. For offices looking to share an inkjet between two or more users, the networkable Z65n comes with an integrated Ethernet network adapter and is priced around $229.

THE SOHO REPORT

Tailor That Email!

Terri Murphy is helping one of her entrepreneurial clients, a high-end travel clothier in Chicago, to build a database that will deliver relevant and timely information to the store's customers.

"Right now," Murphy says, "we're drilling back to past customers to learn more about what they've purchased, and what they've asked for." Armed with that information, the clothier can use sophisticated autoresponders to send highly targeted email messages and opt-in newsletters to individual customers.

"If someone comes into your store and purchases a Kate Spade handbag, they might like to know when new Kate Spades come in," Murphy explains. But customers, she cautions, are quickly turned off by blanket marketing efforts. "It works only if you give them just what they want. That's why it's important to maintain the accuracy of your database, and to tailor your content based on that information."

Buyers want services that edit out the information they don't need. They are pressed for time, so businesses must be relevant and add value, but in a way that is fast and convenient for them.

Fortunately, says Murphy, this sophisticated online marketing technology, which is available off the shelf, is easy to maintain. "For the clothier, it has to be. She's a one-woman show. But by turning her Web site into a 24-hour workstation, her customers can help themselves to the information they need."

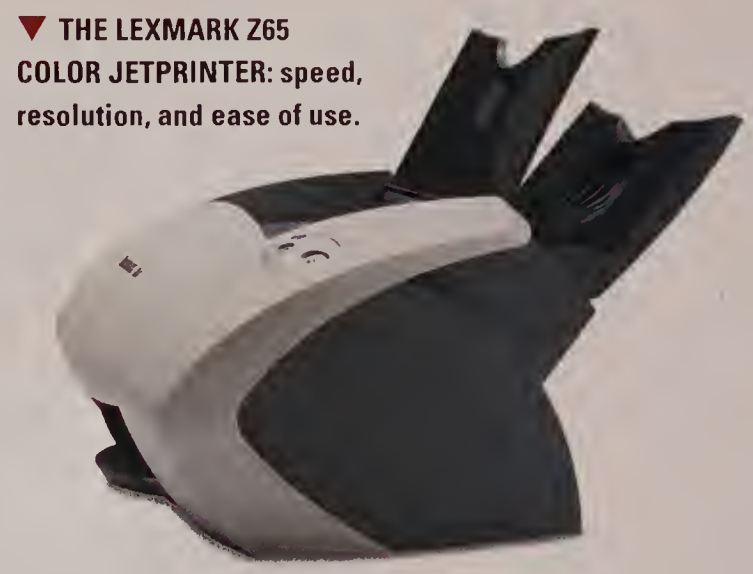
▲ **HPshopping.com: a great way for cash-strapped buyers to pick up the HP PC or printer they're been looking for.**

A Bank at Your Fingertips

Today, understanding the financing options available to purchase information technology can be as important as knowing which products to buy. That's why consumers and business buyers will warmly greet the many finance choices available to them through HPshopping.com (www.hpshopping.com).

For example, buyers can purchase PCs, notebooks, printers, and many other products and qualify for eFinancing for any order over $200. Once approved for eFinancing, buyers can finance any purchase with no minimum and with highly secure account access provided by HPshopping.com's partner, Household Bank N.A. All customer account information handled by Household Bank is stored securely behind a firewall with no direct connection to the Internet, for maximum security of transactions.

▼ **THE LEXMARK Z65 COLOR JETPRINTER: speed, resolution, and ease of use.**

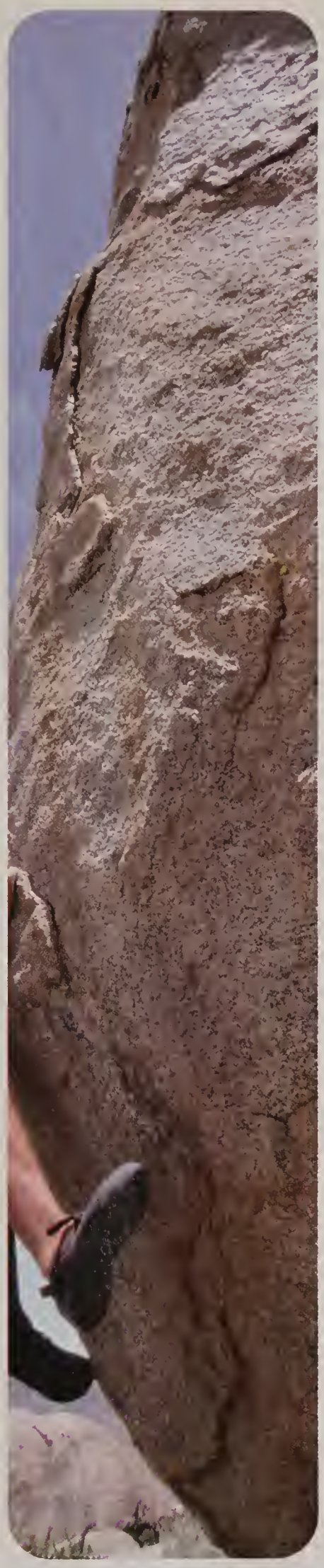


What's more, savvy buyers are able to use HPshopping.com's eFinance to get credit lines of up to $5,000 with no down payment and no application or annual fees. There is a 25-day grace period from the billing date, with no finance charges assessed on outstanding balances if paid by the due date.

HPshopping.com has made the deal even sweeter with a special offer extending through September 8, 2002, whereby buyers are offered no-interest, no-payment options for a full 12 months on orders over $300. It's the perfect way for cash-strapped buyers to get the performance PC or HP LaserJet printer they've needed and wanted.

Murphy acknowledges that the Web contains virtually all of the information consumers could possibly ask for, and that they can typically find products on their own. That's why she insists small businesses must add value to every email or Web page, with relevant consumer tips and other information that demonstrates a firm grasp of their particular market.

A real estate broker, for example, can list tips for first-time homebuyers on his Web site. And the clothier can email travel information to her jet-setting clientele. "Remember," says Murphy, "the key to any service is that you're not selling a product so much as you're selling your wisdom and knowledge about that product."



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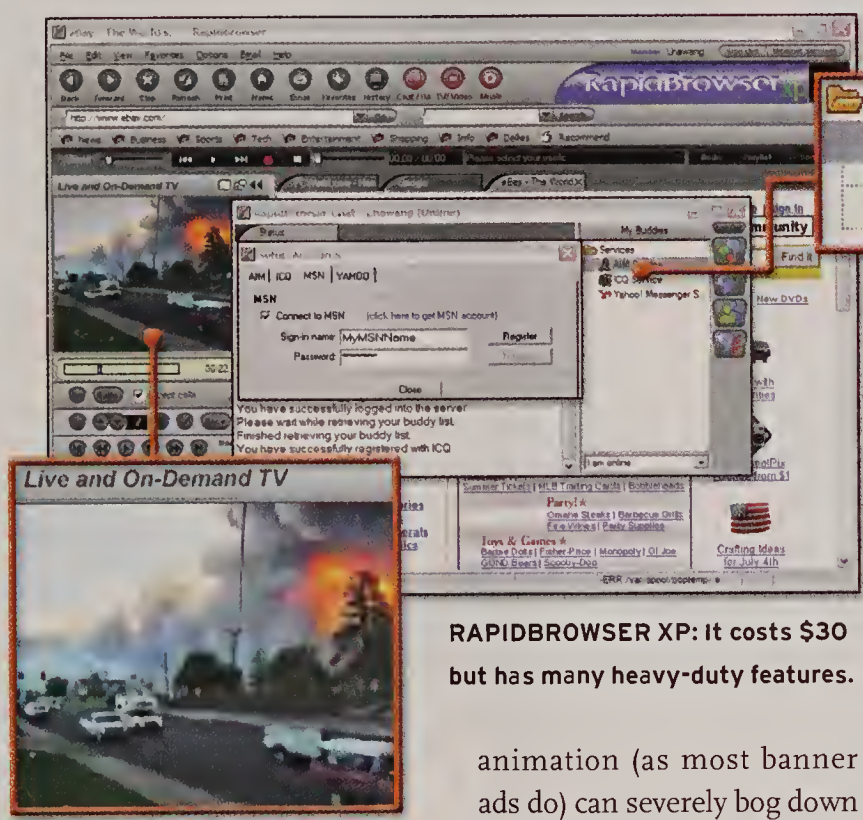
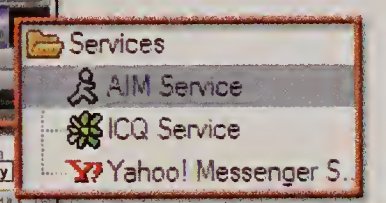


ABOVE: Streaming video is integrated into the main window.



ABOVE: RapidBrowser supports a universal chat and IM client.

RAPIDBROWSER XP: It costs $30 but has many heavy-duty features.

play the tabbed MySidebar window (it's called Sidebar in Mozilla) on the left side of the browser screen to organize and display bookmarks, searches, AOL Instant Messenger buddy lists, news, and stock tickers.

ANOTHER CONTENDER

A THIRD new browser, RapidBrowser XP from RapidMedia Networks, builds on Internet Explorer, transforming it into a multimedia portal geared to broadband users. The tabbed page interface allows you to move quickly among multiple Web pages, but at a cost: Each open page is a freestanding instance of IE, so opening more than six pages that contain animation (as most banner ads do) can severely bog down your PC. If you get tired of closing windows, just turn the tabbed interface off and view all pages in a single window.

RapidBrowser XP's impressive bundle of tools includes notification about incoming e-mail; a universal chat and instant messaging client that supports the AIM, ICQ, MSN, and Yahoo systems; audio and streaming video players that integrate into RapidBrowser XP's main window; and extensive privacy settings that block both pop-up and pop-under ad pages, encrypt cookies, and erase your browsing history, cache, and search text. It also handles videoconferencing and records video from a PC's TV-tuner card.

All this costs $30, but RapidMedia Networks offers to pay you $10 for each person you refer who also pays the $30 fee—a marketing scheme that is sure to endear you to your friends and relatives. In addition, this browser requires you to log in to the company's portal server every time you want to use the software, which should set off your internal privacy alarm. RapidMedia says, however, that the company doesn't track individual user browsing habits. That sounds very much like a Web site's disclaimer, and RapidBrowser XP is basically the front-end software to RapidMedia Network's browsing, chat, and multimedia portal.

RENDER THIS

ONE KEY browser feature is how well it renders such difficult Web content as complex tables and layouts. I compared the new offerings with Internet Explorer 6 by browsing through dozens of sites, and found that all four performed about the same. The Mozilla-based browsers omitted several Active Server Page elements (both graphics and drop-down menus) on Microsoft's home page, undoubtedly because those elements weren't written with a standard Web technology. (This could happen on any similarly written Web page as well.) And none of the three offers the flexibility of IE's drag-and-drop toolbar.

Fortunately, if you want to experiment, you don't have to choose one over another—I ran all four concurrently on my computer and didn't experience much trouble.

—Scott Spanbauer

Mozilla 1
Mozilla.org
★★★★½
This open-source browser omits bundled applications that other Internet tools foist on you.
Free
find.pcworld.com/30047

Netscape 7 Preview Release 1
Netscape
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Mozilla 1's nearly identical twin also sports an AIM-compatible instant messaging client.
Free
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RapidMedia Networks
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List: $30
find.pcworld.com/30044

Double Wi-Fi Network Speeds?

NETWORKING

WOULD YOU race a Ferrari on a course tailored for a Chevy? That question came to mind as I tested U.S. Robotics' 22-megabits-per-second wireless networking products, based on a Texas Instruments chip that purportedly enables networks to run twice as fast as standard 802.11b (Wi-Fi) wireless devices. Since products that use the TI chip (which is also offered by D-Link and others) claim compatibility with Wi-Fi and future variants, such as 54-mbps 802.11g, they sounded like ideal gear for speed demons on a budget.

I set up a wireless network using a laptop connected to the **22Mbps Wireless Access Point** and a desktop PC connected to a wired four-port router. The access point and the **22Mbps Wireless PC Card** were easy to install, but the **22Mbps Wireless PCI Adapter** was not. The latter houses a removable PC Card, whose release button could barely fit through the opening in the desktop's back plate.

Once set up, the network revved up to over 6.4 mbps, handily beating—although not doubling—conventional Wi-Fi speeds (3.7 mpbs to 4.5 mbps). Connecting a second device to the network, however, lowered my average speed to 3.6 mbps.

When I tested the PC Card and the PCI adapter with a conventional Wi-Fi gateway, I got acceptable speeds of about 2.6 mbps. But compatibility is the access point's potential weakness: If even one Wi-Fi client uses the access point, the network's speeds dip to Wi-Fi levels. And with Wi-Fi devices proliferating, someone with a Wi-Fi client inevitably will connect to your network and slow it down. You can secure your network with 256-bit encryption (much stronger than the 40-bit WEP encryption built into conventional Wi-Fi products), but that will also decrease throughput.

In general, Wi-Fi speeds more than suffice for performing everyday tasks such as file transfers and light gaming. So for most users, compatibility limitations and the slightly higher prices charged for USR's 22Mbps products simply don't justify switching from Wi-Fi. The 22Mbps Wireless Access Point costs $170; most Wi-Fi access points are less than $150. The 22Mbps Wireless PC Card retails for $90, while regular Wi-Fi cards cost about $80. The $110 22Mbps Wireless PCI Adapter also is about $10 more than the average Wi-Fi adapter; and since no router is included, you have to make an additional purchase before you can share Internet access. For significantly higher throughput, you might as well spend a little bit more and get 54-mbps 802.11a (Wi-Fi5) products.

22Mbps Wireless Access Point, 22Mbps Wireless PC Card, and 22Mbps Wireless PCI Adapter

U.S. Robotics

★★½☆☆

Skip the wireless limbo of 22 mbps and opt instead for 54-mbps 802.11a (Wi-Fi5) gear.

List: Access Point, $170; PC Card, $90; PCI Adapter Card, $110

find.pcworld.com/30050

U.S. ROBOTICS' 22-mbps wireless networking gear.

Notwithstanding the compatibility of these products with current and future Wi-Fi standards, I don't recommend them—especially not the access point, which requires a pure 22-mbps environment to get its top speeds all the time. After all, what good is a faster engine if you can drive the car only on a closed course?

—*Roy Santos*

Two Wireless Nets, One Box

NETWORKING

IF YOUR growing business wants to give employees fast 802.11a (Wi-Fi5) wireless access to an existing ethernet network while still supporting slower—but more-popular—802.11b (Wi-Fi) equipment, then Intel has a deal for you.

Intel's **Pro/Wireless 5000 LAN Dual Access Point** is the first to support both types of wireless networks, and at about $550 it's only slightly more expensive than buying an access point for each standard.

In my tests with a shipping unit, an 802.11a file transfer took slightly longer while an 802.11b file transfer was in progress. But in general, the speeds were about what you'd expect for each wireless variant—somewhat less than half the specified top speeds of 11 megabits per second for Wi-Fi and 54 mbps for Wi-Fi5.

If you've already invested heavily in Wi-Fi access points, you could save money simply by purchasing Wi-Fi5 access points and installing them next to the Wi-Fi boxes. On the other hand, if you're expanding your wireless network and need the superior speed and user capacity of 802.11a, but you don't want to abandon any 802.11b aficionados, the Dual Access Point's approach might justify the small price premium.

—*Yardena Arar* ▶

Intel Pro/Wireless 5000 LAN Dual Access Point

Intel

★★★★☆

Good access point if you support two types of wireless networks.

Street: $550

find.pcworld.com/30122

PHOTOGRAPH: MARC SIMON

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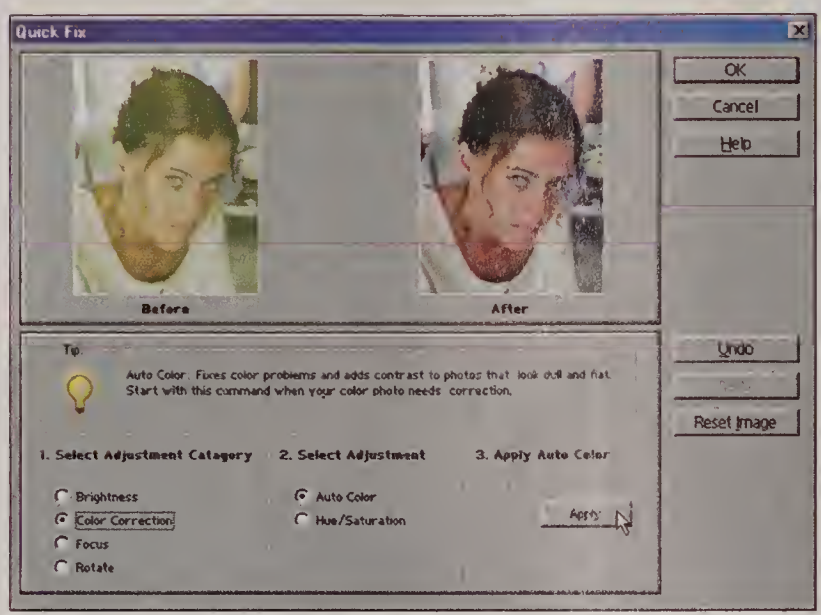
Adobe Adds to Elements

IMAGE EDITOR

MOST IMAGE editing applications fall into one of two categories: lousy and not worth the money, or Adobe Systems' $600 Photoshop. But one, Adobe's $99 Photoshop Elements, does a very good job without breaking the bank. I looked at a beta version of **Photoshop Elements 2**, which is even better than the original.



PRESTO, CHANGE-O: A Quick Fix dialog box in Elements 2 shows a digital photo's Before and After status and some common repair tools.

A new Quick Fix dialog box in Elements 2 shows you before and after versions of an image, along with several often-used tools. You can find all of the tools elsewhere in the application, but Quick Fix explains what they do and how to use them—and it also gives you a Reset Image button that can take you back to the original image.

The program's File Browser now reads and reports metadata—image size, resolution, and creation dates. The feature makes renaming and rotating multiple images easy; but as with the earlier version of Elements (and Photoshop 7), you can't move the Browser window outside the Elements application window, which means the interface can get cluttered. It does dock easily in the toolbar, however.

A help search field now perches in the toolbar—so you don't have to open a database to type in a question such as, "How do I correct color?" The application returns several answers; some of these may be Element's Recipes, which are included, or downloadable walk-through instruction sets.

These changes don't constitute a major upgrade to Elements, but the application still beats all other comers. This well-designed, well-thought-out application packs a lot of value for the money.

—Alan Stafford

Photoshop Elements 2
Adobe Systems
★★★★½
The best image editor you can buy for less than $600.
Estimated list: $99
find.pcworld.com/30038

Microsoft Project 2002: A Faster Start

PROJECT MANAGEMENT

AS ANYONE who has used Microsoft Project 2000 knows, this project manager packs in its many tracking features and charting tools as if they were bread and batteries at hurricane time. But the new Microsoft Project 2002 addresses the issue of overload by adding wizards that guide you through every aspect of constructing a plan for a complex project, monitoring its progress, and finally reporting it.

Microsoft Project Standard 2002
Microsoft
★★★★☆
The granddaddy of project managers adds much-needed Project Guide wizards.
List: $599
find.pcworld.com/30029

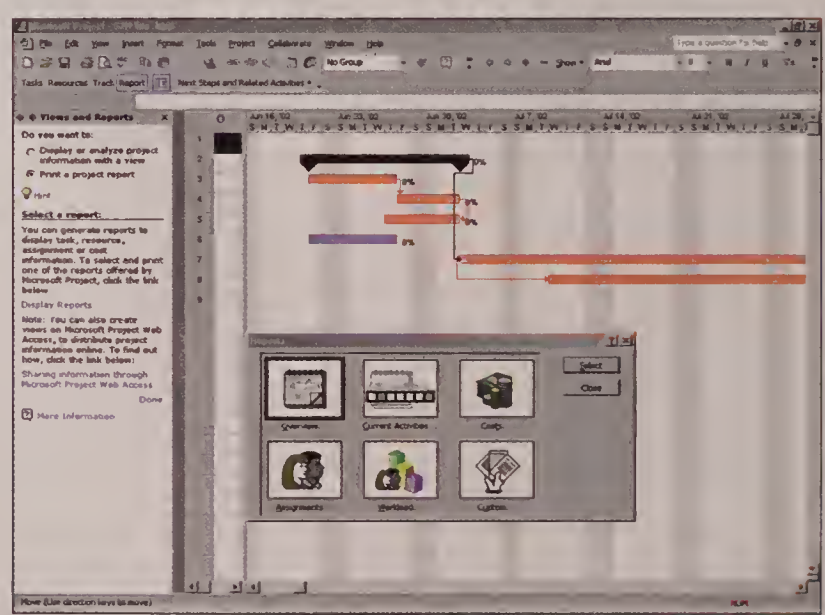
Once I got my shipping copy of **Microsoft Project Standard 2002** running (the install takes time), I appreciated how quickly I could set up a project plan and specify options. The program retains all of Project 2000's options and offers new Project Guide help tools.

The Project Guide wizards (which appear in a left-side window pane) are all business: Concise instructions usher you through defining a project, listing tasks, setting deadlines, specifying workers and associated costs, choosing calendar templates, and saving a baseline version of the project plan. You can import task lists from Microsoft Outlook or save multiple baseline estimates for any project.

Project 2002 tracks the way changes to one aspect of a project affect another, slices and dices all the data, and draws Gantt charts and other graphics for quick e-mail updates or formal presentations.

At $599, this software is not for individuals tracking everyday work. Instead, corporate workgroups or well-heeled small businesses will benefit.

—Laurianne McLaughlin ▶



EASIER: A NEW Project Guide wizard (left pane) helps you quickly make decisions about when to use Project 2002's numerous features.

REE White paper!

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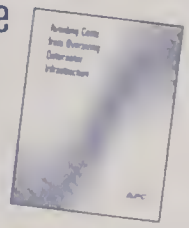

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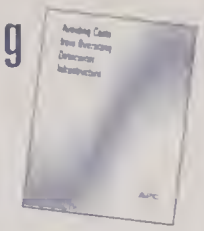

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President of **Liebert Corporation,**
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(InformationWeek, May 27, 2002)

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May 2002

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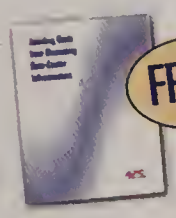

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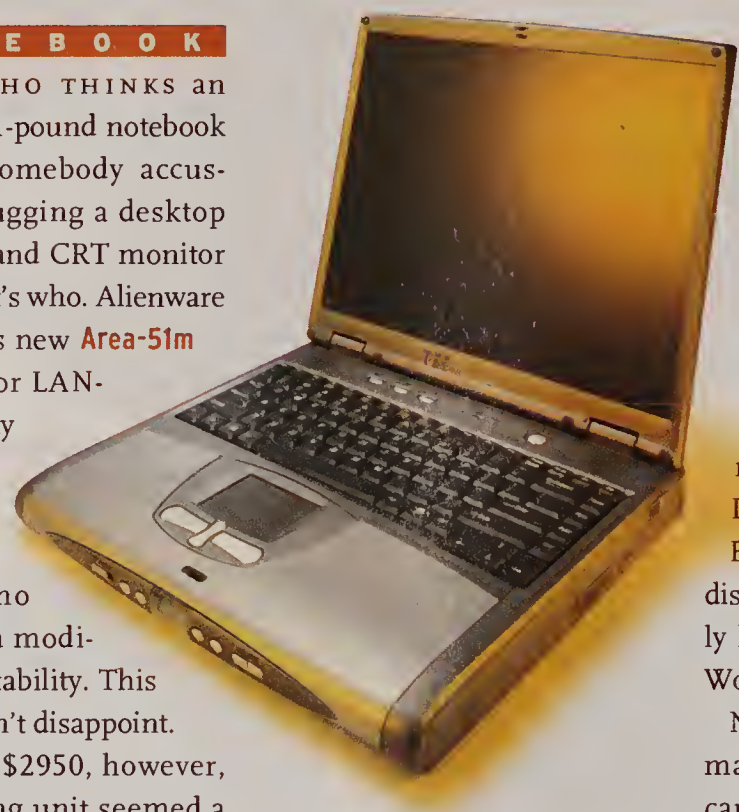
A (Mostly) Mobile Gaming Laptop

NOTEBOOK

TEST Center

WHO THINKS an 11-pound notebook is light? Somebody accustomed to lugging a desktop minitower and CRT monitor around, that's who. Alienware designed its new **Area-51m** notebook for LAN-gaming party attendees and performance junkies who seek even a modicum of portability. This laptop doesn't disappoint.



POWER AND portability: Alienware's Area-51m.

At a stiff $2950, however, our shipping unit seemed a tad overpriced, despite packing such impressive features as a 2.4-GHz Intel Pentium 4 desktop chip, 512MB of DDR memory, an ATI Mobility Radeon graphics chip with 64MB of graphics memory, a 40GB hard drive, a combination 8X DVD-ROM and 8X/4X/24X CD-RW drive, a $73 optional second battery, a 15-inch display, and Windows XP Professional. My informal tests of the Area-51m, using Activision's graphics-heavy Soldier of Fortune 2, proved the unit's gaming mettle—as well as the value of its high-resolution LCD. Despite some jaggies (an inherent problem in LCDs) the screen delivered stunning details. From the gently swaying grass fields my game character tramped through to vivid red pools of blood near vanquished opponents, the Area-51m captured it all without missing a beat of game play.

The Area-51m scored an impressive 102 on PC WorldBench 4, second in our Windows XP Pro notebook tests only to a much less expensive ($2199) Micro Express NP 5240 that scored 107. Remarkably similar in configuration and design to the Alienware notebook (except that the NP 5240 relies on SDRAM instead of DDR SDRAM), the Micro Express supports a lower display resolution (which likely helped boost its final PC WorldBench 4 score).

Note: The Alienware is a hot machine—literally. Despite carrying more fans than a sunbelt locker room, parts of this notebook became quite warm during normal usage.

The Area-51m isn't for frequent business travelers. Its generic-looking chassis is a mammoth 13 by 11.4 by 1.7 inches. And even with a second battery, the unit conked out after 3 hours, 4 minutes in our tests. But if your idea of networking is to sit in a room and compete with 500 other gamers, you'll find plenty to like here—assuming you can get past the hefty price.

—Tom Mainelli

Area-51m
Alienware
★★★½☆
This gamer-oriented notebook has performance to burn, but it doesn't come cheap.
Street: $2950
find.pcworld.com/30035

QUICK TAKES

Music for a Song

CAN'T AFFORD an Apple IPod? Give the RCA **Lyra Jukebox RD2800** a try. At $250, the 10GB version of this MP3 player/portable hard drive combo is half as expensive as a comparable IPod. And the 20GB version ($300), expected by the time you read this, costs from $50 to $100 less than competing models from Creative Labs and Sonicblue. The Lyra's controls are just a bit clumsy, but the resulting slight hassle may be worth the savings. The player comes with headphones, a carrying case, and a car kit. RCA, find.pcworld.com/30020.

–Seán Captain

Point, Shoot, and Pray

DIGITAL CAMERA

COMPACT DIGITAL cameras save space but often sacrifice fundamental features. Consider Toshiba America's 2-megapixel **PDR-T10**. For under $300, you get lots of fancy features, including white-balance controls and multiple flash modes. Unfortunately, such basic operations as focusing, framing, and snapping a shot can be problematic.

Still, it's hard not to like this Klondike bar–sized camera, which can tuck neatly into just about any pocket.

THE PDR-T10.

You run the PDR-T10 mainly by tapping icons arranged in logical, linear fashion on its tiny LCD screen—it's the first camera we've seen with this feature, which proved surprisingly easy to use. But you also must use the LCD's 1-by-1.25-inch active area to frame shots because there's no viewfinder, which is not ideal. The PDR-T10 does store images on a Secure Digital memory card, however, at resolutions of 800 by 600 and 1600 by 1200, and it sports built-in flash plus the usual automatic focus and exposure modes you'd expect.

—Robert Luhn ▶

PDR-T10
Toshiba America
★★½☆☆
Tiny camera is innovative, but taking pictures is challenging.
List: $299
find.pcworld.com/30095

PHOTOGRAPHS: MARC SIMON

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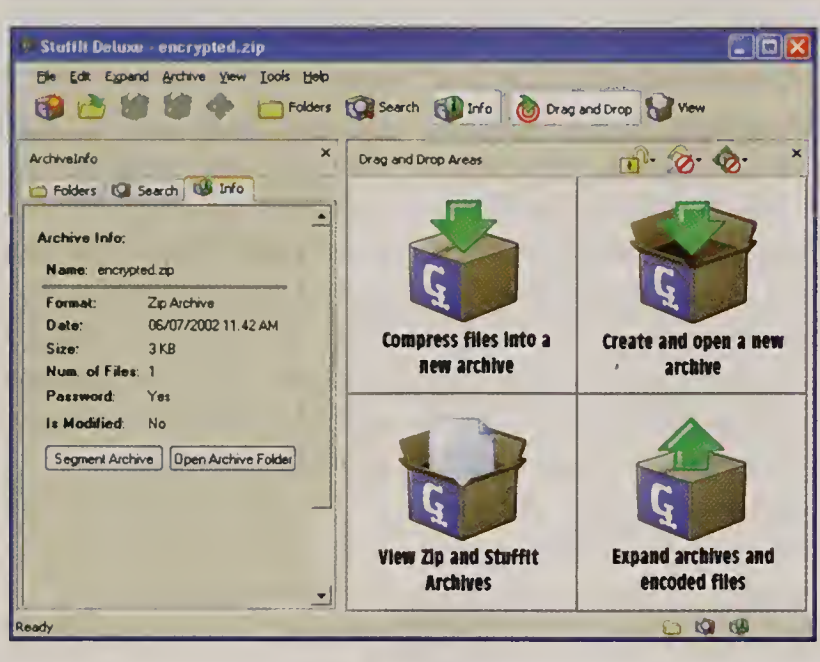
New Compression Software: Zip It Good



ALADDIN SYSTEMS' StuffIt Deluxe 7.5 offers 128-bit encryption and also permits you to exchange compressed files with Macs easily.

UTILITIES

HEAVY USERS of compressed documents and any users who would like to preview zipped files before opening them will be interested in the new versions of PentaWare's PentaZip and Aladdin Systems' StuffIt Deluxe. Both packages let you automate and schedule file compression chores, so you can archive the contents of a particular folder with a single click—or at a set time every day. I looked at shipping versions of both, which also handle compression basics, allowing you to create and restore archive files in .zip and other formats, either within the programs themselves or via Windows Explorer's right-click menu. Unfortunately, flaws make each application less than perfect.

NEW VIEWER

AT $60 ($50 for a download version), PentaZip 5.1 is overpriced, but it carries an excellent file viewer—a useful feature I haven't seen before in a compression program. You can view all sorts of files, copy the contents to the Windows Clipboard, change graphics file formats, and even alter and save a file (though not always in the original format).

But PentaZip behaves in some annoyingly odd ways. For instance, it—like most compression programs (including StuffIt)—lets you zip and mail one or more files from within Windows Explorer, but you can't always opt to have an archive automatically deleted once your mail is sent.

In addition to handling .zip and other common PC files, StuffIt Deluxe 7.5 supports several proprietary compression formats. One of these, .sit, was developed for the Apple Macintosh and manages file name, attribute, and datafork issues as you exchange files between the two platforms. The other format, .pf, offers 128-bit encryption, a decided security improvement over the easily hacked password protection in .zip files.

The $40 StuffIt Deluxe also includes a Microsoft Office add-in that provides easy compression from inside Office 2000 and Office XP applications.

AUTOMATED ARCHIVES

BOTH PENTAZIP and StuffIt offer scripting and scheduling—rare features in archiving tools. By permitting you to define in advance what you want compressed and when it should happen, both packages seem to have potential as reasonably useful backup tools.

Unfortunately, neither program can do a proper incremental backup of files created or changed since the last backup. Both programs can perform date-based incremental backups—replicating files that were created or changed within the last *x* days—but such backups can be unreliable.

For the record, PentaZip's automation is easier to set up, but StuffIt's is more powerful. Each program comes with a terrific self-extraction utility for turning an archive into an .exe file. Both, for instance, allow you to specify what folder the files will expand into—they also let you turn that control over to the recipient.

If you don't need a powerful self-extractor, however, you can spend less. Despite lacking automation and self-extraction features, StuffIt Standard, $25, is worth considering if you exchange files with Mac users or need very secure encrypted compression.

But otherwise, WinZip is the best all-around compression tool. Though it doesn't offer automation or scheduling, a free add-on called WinZip Command Line does—provided you have the time to learn how to use it.

—*Lincoln Spector* ▶

PentaZip 5.1
PentaWare
★★½☆☆
Some nice features, but annoying quirks and a high price make this a less-than-ideal compression-management package.
List: $60 retail, $50 download
find.pcworld.com/30017

StuffIt Deluxe 7.5
Aladdin Systems
★★★☆☆
Decent compression tool adds strong encryption and Macintosh file system support.
List: $40; Standard version $25
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QUICK TAKES

Stylish Stylus/Pen

TIRED OF PECKING at your PDA with a little plastic stick? Find it hard to juggle a stylus and a pen at the same time? A.T. Cross is now shipping the ultimate handheld multitasking tool. The clever Cross Matrix pen's sleek anodized aluminum sheath acts as a holster for a matte-black, easy-to-grip stylus tip that you can pull out, turn around, and reholster to reveal a high-quality fountain or rollerball point (you get to choose). Give the $80 Matrix's top tip a twist to the right or left, and a ballpoint with either red or blue ink appears—so you can still scribble when the stylus point is in use. A.T. Cross, find.pcworld.com/30039.

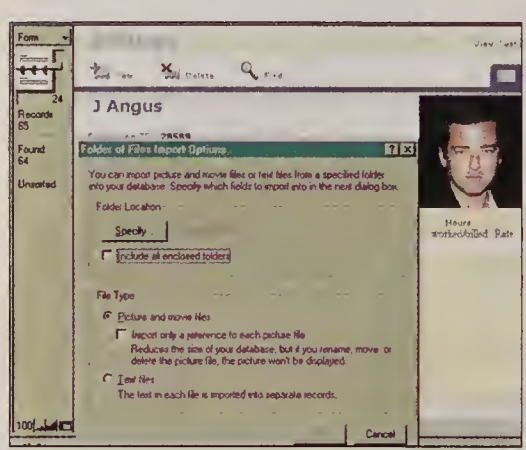
–Anne B. McDonald

FileMaker 6 Gets Graphic

DATABASE

MORE THAN ANY competing database product, FileMaker's FileMaker is suitable for end users who need simple data storage and retrieval, as well as for people who have the scripting skills needed to automate more-complex processes. I looked at a beta version of the new **FileMaker 6**, which incorporates its predecessor's outstanding usability, multiplatform capabilities, and superior graphics handling.

Version 6 lets you effectively manage graphics; for example, it permits you to import an entire set of images at once from digital cameras or folders. It also has Windows XP compatibility and can write and read XML streams, so users can integrate the product with other enterprise databases. That feature alone makes buying or upgrading to this version worthwhile for businesses that are adopting a data-interchange model. An organization's support staff could set up the beginning users—who analyze or interact with database-stored information—and give them a FileMaker window into Microsoft Access, an enterprise resource-planning data source, or SQL.



IMPORT sets of images with FileMaker 6.

This version does fail to correct two shortcomings of its predecessor. The program still lacks data-entry masks; and because it doesn't apply data validation (which it uses in data-entry screens) to batch imports, you must clean up or filter newly imported data.

Other features new to version 6 are tactical improvements, such as a search-and-replace function and a format "painter" that Microsoft Office users will recognize. The new model for complex searching, which allows you to use compound criteria, seems faster to me than the old model. And designers have contributed 21 customizable templates for basic business, education, and home data applications (covering such areas as time billing, purchase orders, and an image catalog), so you can quickly set up the database you want.

—Jeff Angus ▶

FileMaker 6

FileMaker

★★★★☆

Not a must-have upgrade of the popular database program, but it has many usable new features.

List: $149, upgrade $89

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Get Attached to AskSam 5

DATABASE

DATA, LIKE LIFE, comes in structured and unstructured incarnations. Logically, data storage should, too, and AskSam is the rare database that handles both gracefully. I examined a preproduction copy of the new AskSam 5.

AskSam allows you to store complete documents in their original form rather than requiring you to chop them up and distribute their contents into individual fields. Though you can edit individual records just as if you were using a word processor, you get the added benefit of powerful search-and-retrieval tools, as well as the ability to connect information in different documents by creating hyperlinks.

With AskSam 5 you can relate information by attaching a document to a record, just as you would to an e-mail message. You also get more import abilities with this version: You now can import PDF files and messages (with or without attachments) from e-mail clients such as Microsoft Outlook and Outlook Express, as well as Qualcomm's Eudora. Each imported message, which you can bring into the database using the File menu's Import Email command, becomes one database record.

AskSam 5
AskSam Systems
★★★★☆
Allows you to attach complete documents to database records.
List: $90
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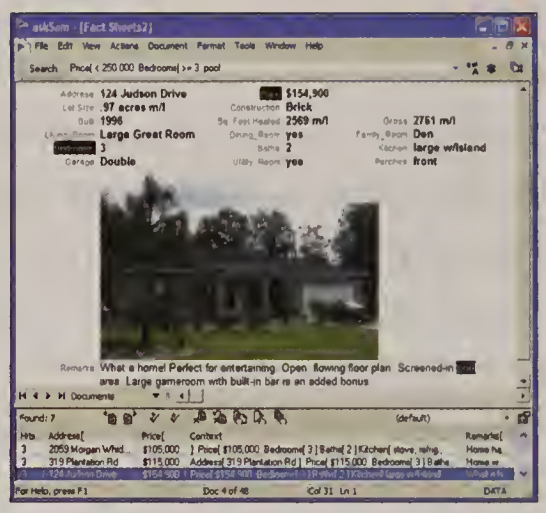

ASKSAM searches its information intuitively.

Organizations that need to store knowledge data (sales, design, competitive intelligence, and research groups) will find that AskSam 5's new hyperlinks to external files are extremely valuable for managing database size and for sharing ever-changing files over a network. Such groups will also appreciate the software's ability to save and share search-process descriptions, which improves the speed and the accuracy of recurrent searches that use the same criteria—say, for sales-figure updates.

In short, AskSam 5 database software enables users and workgroups that need to share unstructured information (as well as forms) to think and produce in new ways.

—*Jeff Angus* ■

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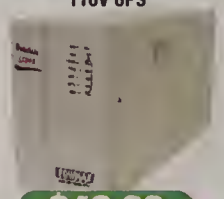
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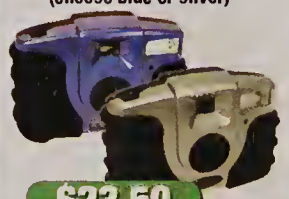
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INSTANT GRATIFICATION

Fashion photographer and art director Patricia Martine knows the value of immediate results. Martine, whose clients include Talbots, Macy's, and Nine West, works with models who earn as much as $2,500 per day. "For each pose, I'll take between 20 and 30 photos. And I want to know immediately if I have images that I can use, or if I have to re-shoot them," she says.

Instant feedback is why Martine, like most other professional and casual photographers, "does digital." But that's just one of many reasons to acquire a digital camera. The ease of posting an image of something you're selling on eBay, e-mailing your mother a family picture, posting a product photo on your Web site, and eliminating the hassle and cost of developing film are some of the many others.

If you're planning to buy or upgrade to a feature-rich digital camera, what are the most important things to consider? Price? Convenience? Image quality? The "coolness factor"? Why not get them all? Olympus's new C-4000 Zoom, a compact four-megapixel digital camera, sets a new standard for delivering rich, vivid images and deep, saturated colors with razor-sharp clarity. And it's loaded with features, such as an all-glass 6.5mm-19.5mm, f2.8-f11 3X optical zoom lens, coupled with a 3.3X digital zoom that delivers a 10X total zoom capability. Capable of producing sharp prints in sizes up to 11" x 14", the C-4000 provides an outstanding combination of features at a price point that will set a new standard for value—less than $500.

▲ **Loaded with features, the new Olympus C-4000 Zoom digital camera is compact and a great value.**

When Less is More

Today's cameras offer more of everything, except bulk. When size and weight matter, Olympus has plenty of experience delivering heavyweight features in a lightweight shell. Consider, for example, another of their advanced cameras, the 11-ounce, three-megapixel C-720 Ultra Zoom. Designed for the photographer who is ready to move up to a more powerful camera, the C-720 features a high-quality 8X optical ultra-zoom lens (24X total seamless zoom) plus a 1/1000th-of-a-second shutter speed, making it ideal for recording sports, action, and nature scenes. Like the C-4000, the C-720 uses removable SmartMedia cards to hold hundreds of high-resolution images, enabling you to take multiple shots of each scene without any worry of running out of storage.

▲ **The 11-ounce, three-megapixel C-720 Ultra Zoom, for the more serious photographer.**

A Pro's Suggestions

"Some of the best techniques can add drama and visual interest to images with very little effort. Everyone should try experimenting with them," says professional photographer and art director Patricia Martine. Her recommendations include:

- **Keep your subject off-center. Consistently centering subjects can indicate a lack of creativity.**
- **Compensate for the off-center subject with focus. For example, keep the subject sharp and blur the background.**
- **Get close to the subject. Too much background tends to distract and confuse the eye.**
- **Instead of straight-on shots, try left and right quarter angles to provide highlights.**
- **Outdoors, place a reflector under the subject's chin to eliminate eye shadows caused by the sun.**

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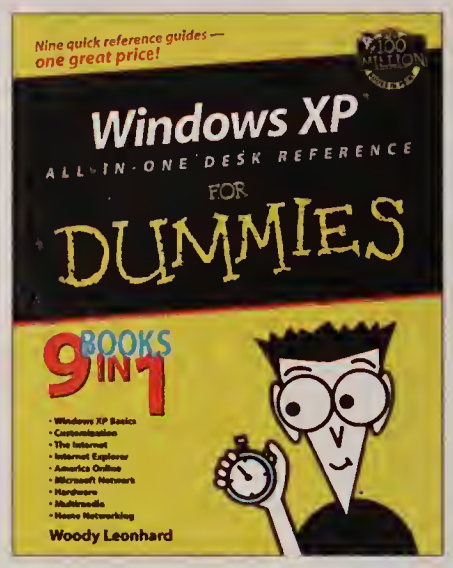

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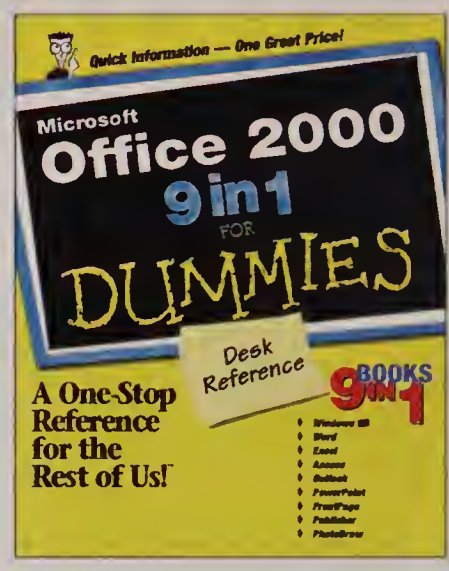

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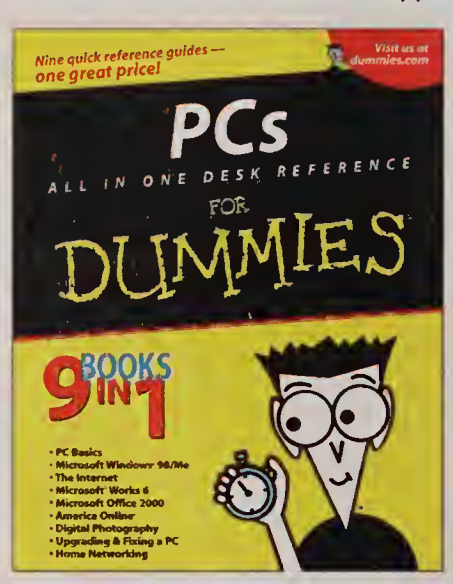

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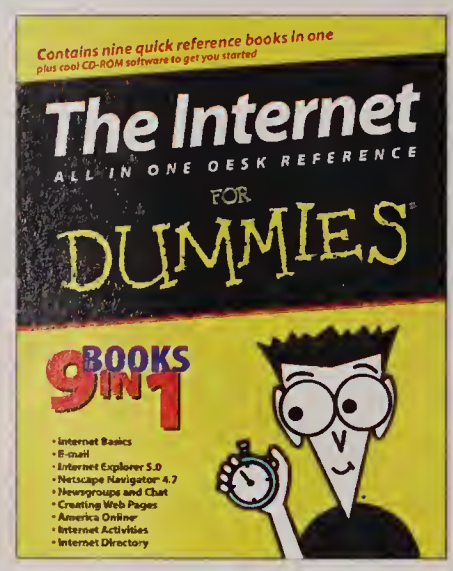

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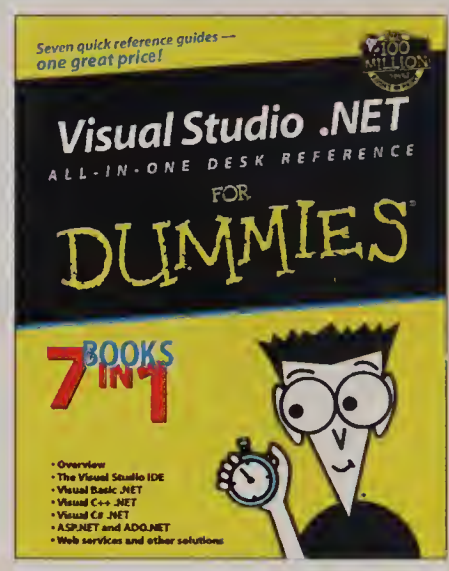

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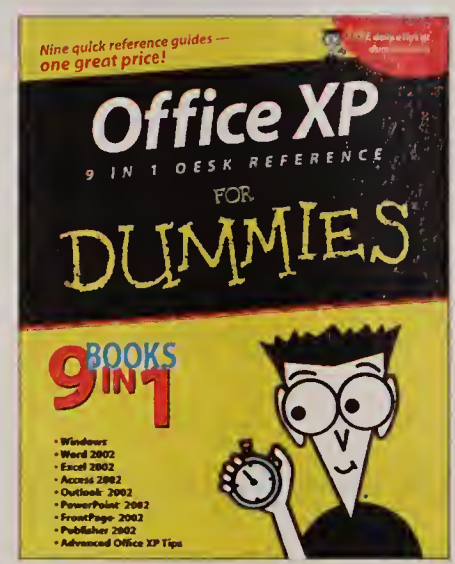

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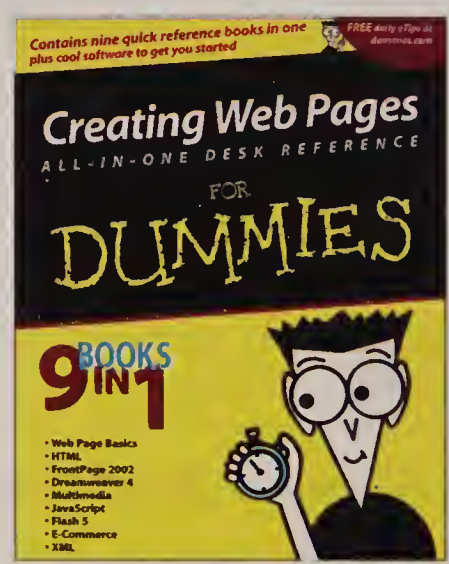

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The complete guide to what to buy and where to buy it.

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AND THE STAFF OF PC WORLD

"WHAT SHOULD I BUY?" *PC World* editors and lab technicians get that question frequently. But even we can't keep up with every computer product, so our monitors expert will ask our printers expert which new ink jet works best for photos, and the printers expert will ask the PDA expert, "Palm or Pocket PC?"

You probably ask the same questions we do. Our first-ever Buyers' Guide issue has answers for 17 of the most important types of computer products. These guides evaluate the latest models, explain their specs, and tell you what to look for when you shop.

For example, investigate whether the new notebook you're considering uses a mobile CPU or one designed for a desktop system (and whether it has the wind tunnel needed to cool it). How long does that rewritable DVD drive take to format a disc? How many shots will that digital camera take before its battery gives out? And how do these models compare to others?

Our guides rank more than 85 products (for even-more-comprehensive charts and reviews, visit find.pcworld.com/30161). And check out "Such a Deal? The Best and Worst Places to Buy on the Web" on page 140 before you're drawn to the checkout line. ▶

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The Box

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TODAY, ALMOST ANY PC on the market can more than adequately handle such standard office chores as word processing and spreadsheets, as well as basic Internet functions like e-mail and general browsing. So for $1000 or less you can get a PC that will suit most people's needs.

If you're a more demanding user who wants to edit digital video or manage a large database, however, you may need more than the basics. Typically, you won't have to spend more than $1500 or $2000 for a system that will suit you today and serve you well for the next few years. The best way to pay only for what you need is to carefully consider what you want to do with your system now, and try to anticipate what might interest you next year. Specific applications call for certain types of hardware—whether at home or in the office. See "Features Follow Function: How to Tailor Your PC" on page 93 for some examples, and check out our recommendations below for more details.

Key Features

➤ **PROCESSOR:** Whether you're looking for a home computer or an office system, if you plan to use your PC for standard productivity and basic Internet tasks, most any CPU will do. AMD is phasing out its value-oriented line of Duron chips, so toward the end of the year you may find good prices on PCs with this CPU. Also look for budget systems using older Intel Celerons, which run at up to 1.4 GHz. Not only will they be $50 to $100 cheaper than PCs with top-of-the-line 1.8-GHz Celerons, but tests by the PC World Test Center show that PCs with the older versions run a bit faster than systems with the new chips: Three PCs with 1.2- or 1.3-GHz Celerons earned an average score of 90 on PC WorldBench 4, while a new 1.7-GHz Celeron unit earned an 83. That's because the new Celeron has half the Level 2 cache that older models do.

If you want more power, Intel Pentium 4 or AMD Athlon XP systems are your best bet. The latest P4 chip runs at 2.53 GHz while AMD's newest Athlon XP 2200+ runs at 1.8 GHz. To save a couple hundred dollars, buy one or two levels below the top—our tests show that for most tasks, you're unlikely to lose more than 5 percent per tier in performance.

Either the P4 or the Athlon XP can support even your most demanding work, such as video editing or high-resolution game play, with ease. *PC World* tests show that P4 PCs tend to do a bit better than Athlon XP–based systems on multimedia

FEATURES COMPARISON

TOP OFFICE PCs

TEST Center

	POWER SYSTEM	Specs	Comments
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2	Gateway 700X ★★★★½ July 02 find.pcworld.com/26921	• $3098 • 2.4-GHz Pentium 4 CPU • 120G8 hard drive, 1G8 RDRAM • 18-inch Gateway FPD 1810 LCD monitor	Pricey system packs a powerful punch and includes a crisp 18-inch LCD monitor, plus a 40X/12X/48X CD-RW drive and a DVD-RAM/R drive.
3	Micro Express MicroFlex 2100A ★★★½☆ Aug 02 find.pcworld.com/28761	• $1499 • 1.73-GHz Athlon XP 2100+ CPU • 100GB hard drive, 512M8 DDR SDRAM • 17-inch Samsung SyncMaster 700NF monitor	8argain PC provides high performance using a motherboard with an overclocked CPU. Has a DVD-RAM/R drive and a good 17-inch monitor.
4	ABS Conquest G4 ★★★★☆ July 02 find.pcworld.com/27041	• $1921 • 1.73-GHz Athlon XP 2100+ CPU • 120G8 hard drive, 512M8 DDR SDRAM • 19-inch Hitachi CM715 monitor	Powerful PC has four US8 1.1 and four FireWire ports on the front for easy access. The 19-inch monitor rendered good graphics and fairly good text.
5	Polywell Poly 883VR-2200 ★★★★☆ NEW find.pcworld.com/29939	• $2495 • 1.8-GHz Athlon XP 2200+ CPU • 80G8 hard drive, 512M8 DDR SDRAM • 18-inch Nfren NF-1800MA LCD monitor	An excellent performer that's well equipped. It comes with two RAID-connected 40GB hard drives, as well as a wireless keyboard and mouse.

Street prices are reported as of 6/14/02. Visit find.pcworld.com/29951 for more rankings and reviews.

PHOTOGRAPHS: MARC SIMON. ILLUSTRATION: CELIA JOHNSON

tasks such as video and audio encoding, completing these jobs between 10 and 15 percent faster. On the other hand, Athlon XP machines outperform the P4 competition on computationally intensive applications like AutoCAD and Adobe Photoshop by about 15 percent.

You can find low-priced systems with either of these chips, even at top speeds. To pay a lower price, you'll have to sacrifice graphics performance and hard drive size (among other things). Such trade-offs may make sense if you plan to upgrade the other components later or if you need more performance now.

Look for a system with one of Intel's newer 850 and 845 motherboard chip sets for its P4s and Celerons. These boards have a higher-speed frontside bus (533 MHz for the P4, and 400 MHz for the Celeron), so data moves more quickly between the CPU and system memory.

Systems with faster Intel P4s—possibly hitting 3 GHz—should arrive by year's end or early next year. AMD will also release new chips later this year. The new Athlon XPs will have double the Level 2 cache of current models, which should boost performance; and next-generation chips, code-named ClawHammer, will have a faster, more direct pipeline into main memory, again increasing performance. (Go to find.pcworld.com/30086 for more details on Hammer chips.)

➤ **MEMORY:** To give Windows XP and software like it sufficient room to work, get a minimum of 256MB of RAM. Memory is still fairly cheap, so if you can afford to get more, do it. High-end PCs should have at least 512MB—that amount lets you keep more apps open and can comfortably handle even memory-intensive programs like Photoshop.

Three main types of memory are on the market today: PC133 SDRAM, faster DDR SDRAM (in 200-, 266-, and 333-MHz speeds), and RDRAM (also known as Rambus, in speeds from 600 MHz to 1 GHz). Remember that your motherboard determines what kind of memory you can use—you can't substitute DDR SDRAM for PC133 SDRAM or RDRAM.

PC133 SDRAM, your cheapest option, appears in low-end home and office PCs. It is ubiquitous as well as inexpensive: PCs you already own likely use it, so you may be able to repurpose it in a new PC.

The price difference between PC133 and DDR SDRAM is just a few dollars (and occasionally disappears), however.

> Our tests show that DDR memory boosts performance by 5 to 10 percent over PC133 SDRAM.

And our tests show that DDR memory boosts performance—from about 5 to 10 percent—over PC133, so DDR offers the best price-to-performance ratio. For now and into early next year, most motherboards won't be able to take full advantage of DDR333 memory, so you're just as well off buying a system with DDR266. In the next 12 months, Intel should issue a ▶

CLOSE-UP

DESIGNS THAT SIMPLIFY SERVICING AND UPGRADES

This Compaq Evo 500 has a laptop-like bay to let you swap drives easily.

Side releases give you tool-free access to the interior.

Gateway's E-series systems offer drives that are easy to slide out, which makes upgrades or replacements a snap.

Dell's OptiPlex opens like a clamshell, allowing tool-free access to components. Color-coded cables help minimize service time.

motherboard that supports DDR333; the motherboards for AMD's ClawHammer chips should also support this memory.

RDRAM offers a slight boost in certain apps such as video or music streaming, but it tends to be two to three times more expensive than the other memory types.

➤ **STORAGE:** You'll get at least a 20GB hard drive even in a basic, sub-$1000 PC. If you're willing to pay just $20 or so more, you'll likely be able to get a 40GB drive. That's fine for most office tasks or for a second or third home PC. If you plan to work with graphics files, video, or music, however, bump the size to at least 60GB. You'll need it because 30 minutes of uncompressed digital video takes up nearly 6.5GB, while 250 4-minute MP3s at 128 kbps use over 1GB. Today's largest drives reach 160GB, and 240GB drives are just down the road, but unless you're planning to use your PC as a mini server, a smaller drive is more cost-effective.

➤ **GRAPHICS:** Only dedicated gamers or people working with 3D models need the best graphics cards, like those with 128MB of RAM and NVidia's GeForce4 Ti or ATI's Radeon 8500 graphics chip.

If you want to do some gaming, get a lower-level GeForce4 MX card with 64MB of RAM, but read the fine print—not all of them will fully support next-generation DirectX 8 games. To record video from your TV, you'll need a card with a built-in TV tuner. (See our graphics card buyers' guide on page 104 for more.)

In the office, unless you're doing high-end graphics work, or Web or multimedia development, integrated graphics should satisfy your needs and save money. Some motherboards with integrated graphics, such as models from Intel or NVidia, provide an upgrade option via an unoccupied AGP slot. Specify this kind of motherboard if you want that upgrade option.

A 17-inch monitor is often the default choice. For about $100 more, you can get a 19-inch monitor, which provides over 20 percent more screen area than a 17-inch model. Also look to upgrade to a better-quality monitor when you buy it with a PC—vendors may offer Trinitron or other flat-faced CRTs for $80 to $100 more than same-size base models. If you're willing to spend $200 to $300 more, consider a 15-inch LCD. It affords the same viewable area as a 17-inch CRT and takes up far less space. (See our monitors buyers' guide on page 120 for more specifics.)

➤ **REMOVABLE STORAGE:** Your most cost-effective and flexible removable-storage option is a CD-RW drive. Even many budget PCs come with CD-RW drives, because they're quite inexpensive. Top-of-the-line drives, which offer up to 48X CD-R speeds and will soon offer 24X CD-RW speeds, cost about $50 to $100 more.

Home users may want to substitute a rewritable DVD drive for a CD-RW drive. You still get CD-R/RW functionality—though rewritable DVD drives are much slower than stand-alone CD-RW drives (typically 4X to 10X on CD-R, and 8X to 12X on CD-RW)—and they store at least 4.7GB of data, versus 650MB for most CDs. They also let you create your own video DVDs to play in your living-room DVD player. Some caveats: These drives cost about $300 to $400 more than CD-RW drives, and you might not be able to play your newly created discs in older DVD-ROM drives and DVD players. Moreover, there are three competing, incompatible standards. (For details see the DVD drive buyers' guide, page 100.)

➤ **COMMUNICATIONS:** A modem is a must at home, and nearly all PCs come with one. If you have broadband Internet access, you'll need an ethernet connection as well (keep the modem as a backup unless you are desperate to save money). To share your broadband connection or to network your PCs, get a gateway/router. You'll probably spend about $80 for a wired version, or about $150 for a wireless 802.11b (Wi-Fi) model; if you do go wireless, you'll also need a card or an external adapter for each PC, and these run about $75 apiece. (See our home networking buyers' guide on page 112 for additional information.)

For your business PC, an ethernet card is key. Unless your company has standardized on specific hardware, the vendor's integrated or default card option should work well and save you money.

➤ **SOUND:** In the office, integrated audio and default speakers are fine. At home, you'll probably want surround sound. For about $200, you can get a

FEATURES COMPARISON

TOP HOME PCs

TEST Center

	POWER SYSTEM	Specs	Comments
1	Best BUY Dell Dimension 8200 ★★★★½ Aug 02 find.pcworld.com/28921	• $3158 • 2.53-GHz Pentium 4 CPU • 120GB hard drive, 1GB RDRAM • 17-inch Dell 1702FP LCD monitor	Deluxe system delivers top-tier performance and entertainment features. It boasts a six-speaker sound system and a large, beautiful LCD.
2	Gateway 700XL ★★★★☆ NEW find.pcworld.com/29921	• $3359 • 2.53-GHz Pentium 4 CPU • 120GB hard drive, 1GB RDRAM • 18-inch Gateway FPD 1810 LCD monitor	This multimedia powerhouse, with its giant LCD monitor and six-speaker audio system, is fully equipped for games, music, and video.
3	MicronPC Millennia XP+ Xtreme ★★★★½ June 02 find.pcworld.com/25103	• $2369 • 1.67-GHz Athlon XP 2000+ CPU • 120GB hard drive, 512MB DDR SDRAM • 19-inch NEC AccuSync 90 CRT monitor	Fast PC handles games with aplomb. It comes with a top-notch monitor that rendered beautiful colors, as well as a good five-piece speaker set.
4	HP Presario 8000Z ★★★★☆ NEW find.pcworld.com/29916	• $3175 • 1.8-GHz Athlon XP 2200+ CPU • 120GB hard drive, 512MB DDR SDRAM • 17-inch Compaq 7020D LCD monitor	Loaded, powerful entertainment PC includes a DVD-RW drive and excellent sound. The LCD showed sharp text and beautiful colors.
5	ABS Awesome 3300 ★★★★☆ Aug 02 find.pcworld.com/28901	• $2099 • 1.8-GHz Athlon XP 2200+ CPU • 120GB hard drive, 512MB DDR SDRAM • 15-inch Samsung SyncMaster 151S LCD	This zippy PC packs AMD's latest CPU and a powerful six-speaker sound system. The LCD produced darkish, blotchy colors but acceptable text.

Street prices are reported as of 6/17/02. Visit find.pcworld.com/30089 for more rankings and reviews.

DECISION STEPS

FEATURES FOLLOW FUNCTION: HOW TO TAILOR YOUR PC

IF YOU WANT TO:	YOU'LL NEED:	BECAUSE:
Play the latest games	2.4-GHz P4 or Athlon XP 2100+ or better; graphics card running on NVidia's GeForce4 Ti 4600 or ATI's Radeon 8500 chip, with 128MB of RAM; audio card with 5.1 Dolby; 19-inch CRT monitor; good speakers with subwoofer; game pad	A high-end graphics card and fast CPU render images more quickly and give you smoother game play. The large monitor makes it easier to see the action. Good audio backs these up, letting you immerse yourself in the play.
Rip music	2.4-GHz P4 or Athlon XP 2100+ or better; 40+GB hard drive; good audio card, such as one from Creative Labs' Audigy series; speakers with subwoofer; separate CD-ROM and CD-R/RW drives	A fast CPU helps you rip your music quickly. A good audio card and speakers let you enjoy rich playback, and separate CD-ROM and CD-RW drives let you rip and burn CDs without copying them to your hard drive first. You can fit about 10,000 4-minute songs on a 40GB drive.
Edit digital video	2.53-GHz P4 or Athlon XP 2200+; 512MB of RAM; 80+GB hard drive; 19-inch monitor or better; FireWire port; 64MB graphics card	Encoding, decoding, and editing video require a fast CPU (P4s are especially adept at this) and plenty of memory for the program to work with. Digital video files are huge (an hour of uncompressed video takes up about 13GB), so you'll need a lot of storage space. A midrange graphics card is fine because you won't be working with complex 3D forms. A large monitor makes the whole thing easy on the eyes. Most digital camcorders use a FireWire port for fast transfer.
Record personal video	2.2-GHz P4 or Athlon XP 2000+ or better; graphics card with TV-tuner capability and recording software; 120GB hard drive; rewritable DVD drive	A faster processor encodes and decodes video more quickly; but if you're taping TV, it won't record any faster. A TV tuner is a must to get the video to your PC. With MPEG-2 video, you get about 10 hours for every 10GB, so you'll need lots of drive space. Burn your video onto a DVD so you can watch your recordings back in your living room.

sound card with Dolby 5.1 support, plus decent speakers with a subwoofer.

➤ **DESIGN:** A good case can greatly simplify the task of upgrading or servicing components—an especially valuable perk in offices with multiple systems to maintain. A well-designed case will offer toolless access to the interior, hard drives mounted on easy slide-out trays, and color-coded cables for internal and external parts (see "Designs that Simplify Servicing and Upgrades" on page 91).

At home, look for at least two USB ports in front so you can easily hook up peripherals like digital cameras. Systems with the newest Intel 845 chip sets (which use DDR SDRAM, not RDRAM) also have integrated USB 2.0. Get it if you can—it works with older USB devices (no speed boost, though), and it offers 8 to 12 times faster performance with USB 2.0 peripherals such as external CD-RW drives. If you have a digital camcorder, get a PC with a FireWire (IEEE 1394) port (you can also add FireWire via an expansion card for less than $100). A keyboard with well-designed shortcuts to favorite apps and Web sites, to e-mail, and even to documents is a nice, inexpensive plus.

If you plan to keep the system for a while, make sure you have some expansion room. You'll want at least a couple of open drive bays and a free PCI slot.

➤ **SOFTWARE:** Most home and office PC users should find Windows XP Home a perfectly acceptable operating system. Spend the extra $100 for Windows XP Pro only if you need management features such as Remote Desktop, which gives you remote control over another PC.

Consider upgrading the software when you buy a new PC. For about $100, you can often upgrade to a full office suite like Microsoft Office XP Small Business Edition (sold only with new systems; lacks PowerPoint) from Microsoft Works Suite or a similar package—a great value since Office XP runs over $400 off the shelf.

➤ **WARRANTY AND SUPPORT:** Many PC problems tend to crop up in the first year, so a one-year warranty should cover most repairs. A two- or three-year warranty will add about $150 to $200 to your cost. Some vendors offer additional support options, such as Dell's $39 (one year) priority call routing to tech support.

If you're concerned about reliability and service, you're probably better off buying from major vendors. While no vendor earned the highest rating in our last reader survey on vendor reliability and service, Dell, HP, and IBM scored well with their work PCs. Dell retained its position for home PCs as well, while Gateway, HP, IBM, and MicronPC earned an overall grade of Fair from readers. (Go to find.pcworld.com/30005 for more details.)

Recommendations

ALMOST ANY PC VENDOR can build you a system that will meet your computing needs. You may prefer to check out systems from Dell, Gateway, IBM, or MicronPC, because these brands typically offer better service and support. If you're looking for easy-to-set-up systems for the home with extras like tutorials, conveniently placed ports, and keyboards with shortcut keys, see models in the Pavilion or Compaq Presario lines from HP, the 500 and 700 series by Gateway, or the Dimension line from Dell.

Larger offices should consider corporate-specific PCs, such as Dell OptiPlexes or Compaq Evos from HP. These units incorporate the vendors' easy-to-service cases and a host of manageability options, including component tracking, Wake-on-LAN, and remote management.

—Anush Yegyazarian ▶

Notebook PCs

WHAT MATTERS: Power makes a difference if you're replacing a desktop, but portability means more to travelers.

IBM ThinkPad T30

IF YOU'VE EVER SHOPPED for a notebook PC, you know that the factors you should consider go far beyond performance and connections. Notebook buyers also have to mull such variables as size, weight, screen dimensions, battery life, and keyboard quality—not to mention options such as built-in wireless.

Many top-of-the-line and some midrange portables—including four of the five power notebooks listed in the chart below—are now available with an Intel Pentium 4 Processor-M, which comes in versions with clock speeds of 1.7 GHz, 1.8 GHz, 1.9 GHz, and 2 GHz.

This year, just when we thought notebook screens couldn't get any bigger, Sony introduced its VAIO PCG-GRX570, with the first-ever 16.1-inch display. With 14- and 15-inch screens already appearing on $1100 portables, you can expect the newest giant screen to trickle down eventually to some budget notebook PCs.

Key Features

➤ **PROCESSOR:** The old rule about waiting for new technology to drop in price before you buy applies more than ever to notebooks with the latest CPUs. In our PC WorldBench 4 tests, laptops carrying the first iterations of Intel's Pentium 4 ran no faster—and in some cases ran slower—than the same notebooks equipped with 1.2-GHz Pentium III-M chips. A few portables use P4 desktop processors, which can give them a performance advantage if they're built to withstand the extra heat.

Right now, people who have modest computing needs can save a lot of money by sticking with a PIII-M notebook.

➤ **SYSTEM MEMORY:** Don't settle for anything less than 256MB of system memory if you want to do more than word processing and e-mail, because Windows XP and newer applications quickly chew up memory and threaten to slow down your work. Memory slots are usually fairly easy to reach on notebooks, if you wish to upgrade.

➤ **GRAPHICS MEMORY:** You'll want 32MB or 64MB of video RAM if you plan on using your laptop to drive external monitors for presentations. Make sure that the memory is dedicated rather than pulled from main memory; this is sometimes referred to as a universal (UMA) or shared (SMA) memory architecture.

➤ **SCREEN:** Some portables with 14.1-inch and 15.1-inch screens now cost as little as $1200. But business-class fliers who prefer a more compact notebook screen size of 12.1 or 13.3 inches may soon have only ultraportables to choose from.

➤ **BATTERY:** In battery tests conducted by the PC World Test Center, battery life in units equipped with the new P4-M chip averaged roughly 2.5 hours. While Intel and notebook manufacturers try to iron out the P4-M's power consumption kinks, consider buying a notebook that uses the older Pentium III-M chip; these portables posted battery lives of between 3 and 3.5 hours in most cases. Most notebooks come with a lithium ion rechargeable battery, which lasts longer than the less common nickel metal hydride rechargeable and doesn't need to be replaced as often.

If you want more time away from an outlet, buy a notebook that has a modular bay capable of holding a supplementary power pack. Secondary batteries usually cost between $100 and $200. ▶

FEATURES COMPARISON

TOP NOTEBOOK PCs

TEST Center

	POWER NOTEBOOK PCs	Specs[1]	Comments
1	Best BUY Dell Inspiron 8200 ★★★☆☆ Aug 02 find.pcworld.com/28021	• $2279 • 1.7-GHz Pentium 4-M • 256MB of RAM, 40GB hard drive • 15.1-inch screen, 9.4 lb	The Inspiron 8200 is the SUV of the notebook world: It's big and heavy, has lots of features, and guzzles power—its battery lasted just under 2.5 hours.
2	MicronPC TransPort GX3 NEW ★★★½☆ find.pcworld.com/29897	• $2499 • 1.8-GHz Pentium 4-M • 256MB of RAM, 40GB hard drive • 15-inch screen, 8.0 lb	A fingerprint reader and a keyboard with loud but impressively deep-traveling keys highlight this stylish blue-and-silver laptop. Like the Inspiron 8200, its battery lasted 2.5 hours.
3	IBM ThinkPad T30 NEW ★★★½☆ find.pcworld.com/29898	• $3249 • 1.8-GHz Pentium 4-M • 256MB of RAM, 40GB hard drive • 14.1-inch screen, 6.7 lb	This lightweight two-spindle machine is IBM's first with dual pointing devices. It also has a complete set of connections, and both Bluetooth and 802.11b wireless built in.
4	IBM ThinkPad A31 ★★★½☆ July 02 find.pcworld.com/27181	• $2674 • 1.6-GHz Pentium 4-M • 256MB of RAM, 40GB hard drive • 15-inch screen, 8.2 lb	The A31 provides plenty of features for the price—including dual modular bays—but its performance was not strong and its battery life (2.5 hours) was disappointing.
5	Compaq Evo N600c ★★★½☆ June 02 find.pcworld.com/25401	• $2818 • 1.2-GHz Pentium III-M • 256MB of RAM, 30GB hard drive • 14.1-inch screen, 6.7 lb	Dual pointing devices and an optional silver wireless module highlight this square black laptop. It comes well equipped; features include a composite video-out port and decent sound.

Visit find.pcworld.com/29901 for more rankings and product reviews.

[1]Street prices are reported as of 6/14/02. Weight includes computer, AC adapter, power cord, floppy drive, and optical drive.

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➤ **KEYBOARD AND POINTING DEVICE:** A thin-and-light notebook usually has smaller-than-average keys spaced more closely than the ones found on a desktop-replacement model. Even notebooks with the same standard 3mm travel (the distance a key depresses) and 19mm spacing (from the center of one key top to the next) can feel different, however, and their layouts may differ significantly.

For people who can't choose between a touchpad and an eraserhead pointing device, some notebooks include both. If you buy one of these dually equipped portables, make sure that it provides two sets of mouse buttons—one for the touchpad and the other for the eraserhead—so you don't have to stretch to reach.

➤ **OPTICAL AND OTHER DRIVES:** Built-in rewritable-DVD drives aren't likely to arrive in notebook PCs anytime soon, but if you can afford it, the next best thing is a combination DVD-ROM/CD-RW drive. Midrange machines usually feature a DVD-ROM drive or a CD-RW drive, and only the least-expensive notebooks come standard with just a CD-ROM drive.

The floppy drive has outlasted its SuperDrive and Zip drive challengers and continues to appear in many notebooks. Some "legacy light" portables have phased it out, but you can buy a USB add-on floppy drive for less than $100.

➤ **HARD DRIVE:** Notebook hard drives will continue to get larger, from 60GB to 80GB and beyond. You can save money by opting for a 20GB or 30GB model, however. Most hard drives are easy to remove if you wish to keep your data safe.

➤ **WEIGHT AND BAY DESIGN:** Notebooks range from massive 9-pound all-in-one models, which have both the floppy drive and the optical drive built in, to 3-pound ultraportables that must use external drives. The once-rare one-bay notebook has become increasingly prevalent because of its appealing balance of features and weight. For instance, members of IBM's ThinkPad T series include a 14.1-inch screen and a full set of connections yet weigh less than 6 pounds—at least a pound less than most full-size notebooks. The trade-off: ThinkPad T models don't have a built-in floppy drive.

Many full-size models offer the floppy drive as a modular device, so you can swap it out for a second optical drive, a second hard drive, or a Zip drive.

You should consider the weight not only of the notebook, but also of the AC adapter, any external modules, and their cables. Ultraportables have lightweight adapters but can weigh almost as much as a full-size notebook if you take along their external optical and floppy drives.

When you return to your desk, you can snap most notebooks onto an extra-cost docking station or port replicator (prices range from $99 to $499). This saves you from repeatedly having to plug in and unplug desktop peripherals.

➤ **COMMUNICATIONS:** Fewer portables these days come with a full set of legacy ports. Serial ports are rare, and the combination mouse/keyboard PS/2 port and the infrared port soon will be. Most notebooks still have a parallel port and one PC Card slot, though; and most also have at least two USB ports. A growing number now include a FireWire (IEEE 1394) port. Built-in ethernet comes standard on almost all portables. You can also expect built-in 802.11b wireless components to become standard. A few vendors offer notebooks with Bluetooth built in, but you should only consider choosing this option if you already have Bluetooth-enabled devices that you wish to sync.

A smattering of notebooks now come with new types of card slots, including CompactFlash, Secure Digital, Memory Stick, and Smart Media. A notebook with a CompactFlash card or Secure Digital slot is your best bet.

CLOSE-UP

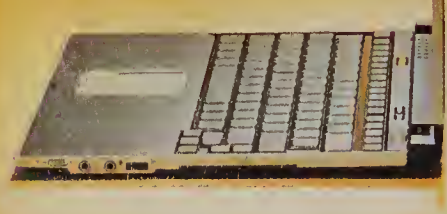
WHAT ARE THE TRADE-OFFS?

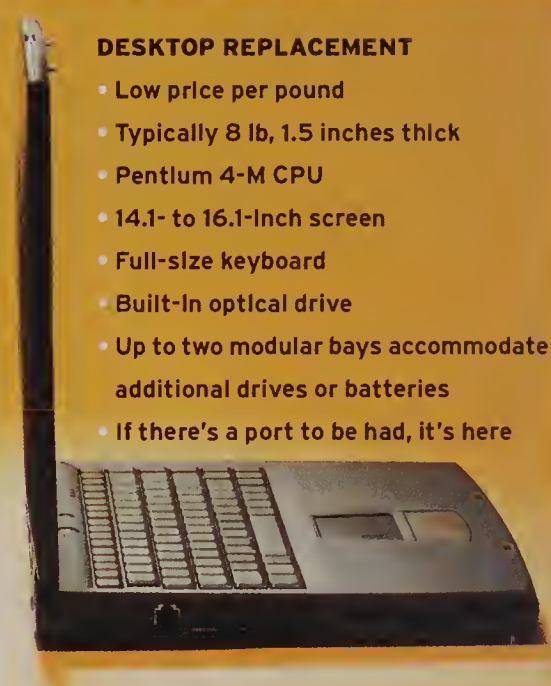
ULTRAPORTABLE

- High price per pound
- Typically 3.5 lb, 1 inch thick
- Low-voltage PIII-M CPU
- 10.4- to 12.1-inch screen
- Reduced-size keyboard
- No built-in drives
- No modular bays (external, extra-cost drives only)
- Often omits legacy ports

DESKTOP REPLACEMENT

- Low price per pound
- Typically 8 lb, 1.5 inches thick
- Pentium 4-M CPU
- 14.1- to 16.1-inch screen
- Full-size keyboard
- Built-in optical drive
- Up to two modular bays accommodate additional drives or batteries
- If there's a port to be had, it's here





The Toshiba Portégé 2000 (left) and the Dell Inspiron 8200.

Recommendations

PEOPLE LOOKING for the latest features, such as built-in wireless, generally have one option: one of the new Pentium 4-M notebooks. Unfortunately, most P4-M–based notebooks are pricey and can be slower than those with the PIII-M. If you don't need a P4-M notebook's high-end features, opt for a PIII-M notebook priced at $1500 or less. Many 3- and 4-pound ultraportables (for which a low-voltage version of the P4-M has not yet been developed) still carry the PIII-M processor, too. Most ultraportables cost $2000 or so, but they're a good alternative, especially if you need a lightweight laptop.

—*Carla Thornton* ▶

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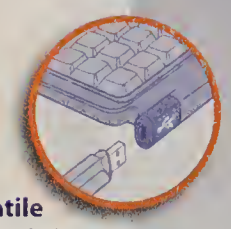

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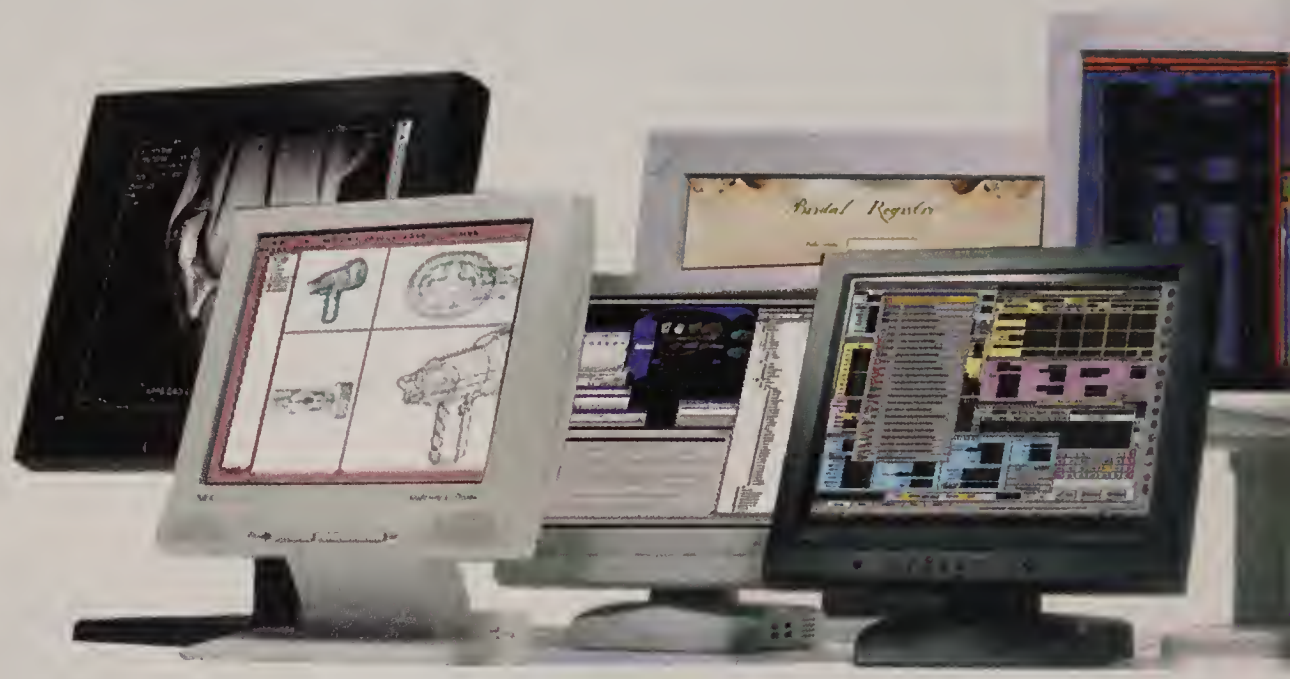

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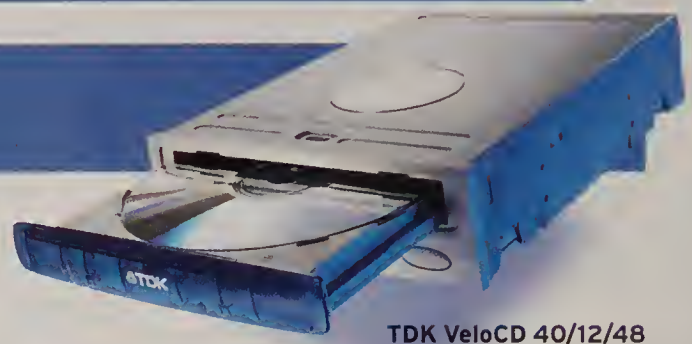
NEC/MITSUBISHI
NEC-MITSUBISHI ELECTRONICS DISPLAY

Inside the Box

Whether you're upgrading your PC or building one from scratch, stock your system with the best interior components—CD-RW drives, rewritable DVD drives, hard drives, graphics boards, and motherboards.

CD-RW Drives



TDK VeloCD 40/12/48

WHAT MATTERS: Prices don't vary much, so look for fast models that have features such as Mt. Rainier support.

SPEED ISN'T EVERYTHING: In the past year, CD-RW drive technology has vaulted over one speed hurdle after another—reducing the time required to write a CD by almost half. The CD-RW drive market is nearing maturity, however, and speed achievements mean less than they once did—consider that the difference in times posted by a 24X drive and a 48X drive when writing a full CD is less than 2 minutes. Factors such as the price, the drive interface, and the software bundle assume greater import—especially since the same internal mechanism often shows up in drives from several different vendors.

Key Features

➤ **CD-R WRITE SPEED:** CD-RW drives use X-ratings to indicate writing and reading speeds, where 1X equals 150 KBps; the ratings listed on the box indicate the drive's maximum speed for reading from or writing to a disc, not its average speed (which may be about 4X to 6X less than the X-rating). Though drives that burn to write-once CD-Rs at up to 48X now reign supreme, models capable of 52X will go on sale later this year. Thereafter, industry experts say, the escalation in CD-R write speeds will slow dramatically—and may stop altogether—due to technological limitations (remember how CD-ROM drives topped out at 56X?) and diminishing returns. After all, burning a full disc now at up to 48X requires about two and a half minutes; ratcheting the write speed up to 52X will shave mere seconds—not minutes—off that time.

Buying the fastest drive available today won't break your wallet, and it will make the burn process fly by. We found the first 48X-rated drive we tested, Pacific Digital's Mach 48 CD-RW, being sold for the same price as older, slower 40X drives—which take, on average, 22 percent longer to burn a full disc. (See "CD-R Write Speeds Inch Upward," page 99, for more detail.)

➤ **CD-RW WRITE SPEED:** For the past 18 months, the speed at which drives write to rewritable CD-RW media has held fairly steady, making only a modest jump from 10X to 12X at the start of the year. In real-world terms, the bump up to 12X means that you can use packet writing to burn 100MB of data to a CD-RW 14 percent faster, on average, than you could with a 10X drive. Expect more punch out of the next increase in rewritable speeds: Drives with 16X and 24X rewrite speeds should be out by the time you read this

FEATURES COMPARISON

TOP CD-RW DRIVES

TEST Center

	CD-RW DRIVE	Specs[1]	Comments
1	Best BUY Pacific Digital Mach 48 CD-RW NEW ★★★★☆ find.pcworld.com/299D6	• $110 • 48X/12X/48X • Ahead Nero Burning ROM 5.5 and InCD 3.27, 2MB buffer	This model sped through our CD-R tests 48 seconds faster than the average 40X drive we've tested. CD-RDM read performance was sluggish, however.
2	Best BUY LG Electronics GCE-8400B NEW ★★★☆☆ find.pcworld.com/299D7	• $110 • 40X/12X/40X • Roxio Easy CD Creator 5.1 and DirectCD 5.1, 2MB buffer	A good CD-R writer, the GCE-8400B is priced the same as the Pacific Digital 48X drive. But it's ranked next to last on both of our CD-ROM read tests.
3	CenDyne Lightning III LTR-40125S ★★★★☆ July 02 find.pcworld.com/28283	• $95 • 40X/12X/48X • Ahead Nero Burning ROM 5.5 and InCD 3.2, 2MB buffer	This inexpensive drive's CD-R performance ranks in the upper third of all the drives we've tested; it nearly ties for first place in packet writing to CD-RW.
4	TDK VeloCD 40/12/48 ★★★★☆ July 02 find.pcworld.com/28284	• $135 • 40X/12X/48X • Ahead Nero Burning ROM 5.5 and InCD 3.24, 2MB buffer	An average-price drive, TDK's VeloCD 40/12/48 has the second best CD-R performance we've seen—and ranks fifth on our CD-ROM read tests.
5	Teac 40x12x48 CD-RW ★★★★☆ Aug 02 find.pcworld.com/29521	• $100 • 40X/12X/48X • Roxio Easy CD Creator 5.2 and DirectCD 5.2, 8MB buffer	This model delivers fast CD-R write performance, but it lags just a bit behind the norm for CD-RW performance (by about 9 percent, or 10 seconds).

Visit find.pcworld.com/30197 for more rankings and product reviews.

[1] Street prices are reported as of 6/18/02. Speeds for CD media are listed as follows: CD-R write/CD-RW write/CD-ROM read; in all cases, 1X = 150 KBps.

PHOTOGRAPH: MARC SIMON; ILLUSTRATION: CELIA JOHNSON

(although compatible media may be hard to find at first). CD-RW media costs more than plain CD-R media (about $1 apiece versus $0.50 or less for CD-Rs, depending on brand, speed, and quantity), but it's handy for short-term backups, and CD-RW discs are reusable—they're rated for up to 1000 full rewrites.

➤ **CD-ROM READ SPEED:** The fastest drives can read CD-ROMs at up to 48X. However, tests by the PC World Test Center show a far greater variance in the performance of drives rated as 48X readers than we typically see in either CD-R or CD-RW write performance. For example, in our application installation and digital audio extraction tests, drives rated to read CD-ROMs at 48X ranked as high as first and as low as fifteenth overall—behind several drives rated at 40X.

➤ **BUFFER SIZE:** CD-RW drives typically come with at least a 2MB buffer. The buffer ensures that data flows to the disc smoothly and without interruption. Before buffer underrun protection schemes such as Burn-Proof and Smart-Burn became prevalent, drives needed to have larger buffers to prevent buffer underruns (and ruined discs) from occurring. Some drives still provide a 4MB or 8MB buffer, but now the role of a large buffer is to minimize how often buffer underrun protection is invoked, and thereby to speed the burn process.

➤ **INTERFACE:** Internal IDE drives are the least-expensive CD-RW drives you can buy, and they're easy to install if you don't mind opening your system. FireWire (IEEE 1394) and USB 2.0 drives both perform similarly to internal IDE models, but FireWire drives tend to cost about $20 to $40 more than USB 2.0 drives, due to the costs of integrating the FireWire controller into the drive. When you use a USB 2.0 drive via a USB 1.1 port, the interface will limit the drive's throughput when writing to CD-R and CD-RW to about 4X, regardless of the drive's internal maximum write speed.

A few external drives offer multiple interfaces—some combination of FireWire, USB 2.0, PC Card, and even parallel port—but you'll pay more for one of these than for a standard external drive (for example, LaCie's USB 2.0 and FireWire drive, the 40x12x48x U&I CD-RW, sells for $220; TDK's USB 2.0–based VeloCD 40/12/48 sells for about $185).

➤ **SOFTWARE:** All drives include CD mastering and packet-writing applications to enable data copying and music CD creation. But some, like Ahead's Nero Burning ROM 5.5, are more powerful than others; and some, like Oak Technology's SimpliCD and Roxio's Easy CD Creator, are easier to use. A handful of vendors include additional software, such as rudimentary image editors or audio juke-boxes (like TDK's Audio MixMaster) for ripping and organizing your MP3s. Yamaha is the only internal-drive vendor that bundles backup software—a boon considering the cost of buying the backup application separately.

➤ **MT. RAINIER:** Drives with Mt. Rainier technology integrate support for writing directly to CD-RW media via the operating system, bypassing the need for third-party packet-writing software such as Roxio DirectCD. For now, only versions of Linux based on the latest Linux kernel support Mt. Rainier. Microsoft says that it will implement the spec in the next version of Windows, code-named Longhorn, due sometime next year.

Forward-looking drives integrate Mt. Rainier, a spec for writing to CD-RW media via your OS.

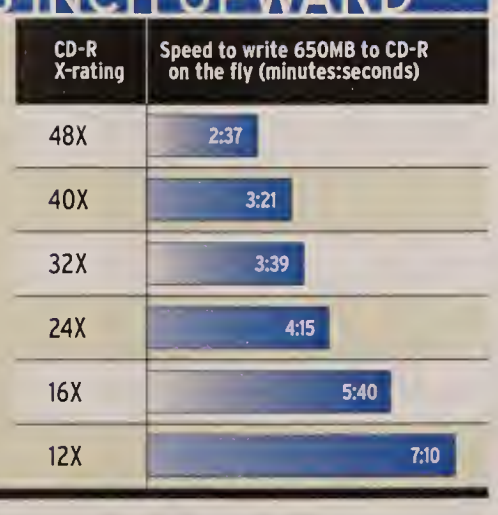
Other advantages to Mt. Rainier include the format's support for disc formatting on the fly and its improved defect management to help overcome errors on a disc. Unfortunately, discs written using Mt. Rainier won't be backward-compatible with older operating systems such as Windows 98 or Windows XP, so you'll still need third-party software like DirectCD 5.2 to read (or write to) the discs.

Some drives already claim to support Mt. Rainier, but in many cases you'll need to upgrade the firmware or packet-writing software (or both) to get full support.

CLOSE-UP

CD-R WRITE SPEEDS INCH UPWARD

HAVE AN OLDER DRIVE that writes to CD-R at 12X or 16X, and want to know how much time you'll save by upgrading to a faster drive? We've compiled the results of our on-the-fly CD-R write test for a range of drive speeds so you can see how much time you might save by using a faster drive to burn a full 650MB CD-R. Times represent average performance across the field of drives that the PC World Test Center evaluated in each speed class.



Recommendations

AS CD-RW DRIVE hardware becomes more and more commodified, you can't go wrong by buying the fastest drive for the money. If you plan to rip audio CDs to MP3s, though, get a drive that includes audio-specific software, such as the TDK VeloCD 40/12/48. And check for Mt. Rainier support if you use Linux or plan to upgrade to the next version of Windows. Several models, including our number one drive, Pacific Digital's Mach 48 CD-RW, are Mt. Rainier–ready.

—Melissa J. Perenson ▶

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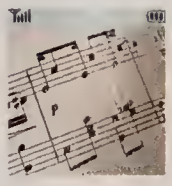
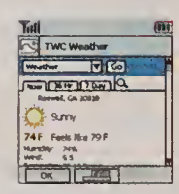


Ringers



Web

Services require purchase of a Vision-enabled PCS Phone (capabilities will vary by model) and service plan. PCS Vision Camera is required for digital photography. All screen shots are simulated. Copyright ©2002 Sprint Spectrum L.P. All rights reserved. Sprint, the diamond logo and PCS Vision are trademarks of Sprint Communications Company L.P. All other trademarks are the property of their respective owners.

Rewritable DVD Drives

HP Dvd200e (top) and Dvd200i

WHAT MATTERS: Of the competing drive types, DVD+RW copies data and formats discs fastest, but DVD-RW is more compatible.

INTEREST IN DVD WRITERS is soaring—and no wonder: The average price of a drive has dropped by more than half in the past 18 months, and prices are destined to go even lower. Rewritable DVD has a ways to go before it approaches the popularity of CD-RW (competing, incompatible formats remain a serious issue), but its ability to put 4.7GB—nearly seven times as much data—on a CD-size disc is sure to cut into CD-RW's turf.

Key Features

➤ **WRITE-ONCE DVD:** The two write-once flavors for you to consider are DVD-R and the slightly faster DVD+R. Because both of these formats use media that has a highly reflective backing, they offer the greatest compatibility with set-top DVD players (and with DVD-ROM drives). Accordingly, write-once media is usually the best choice for burning video DVDs you want to view on your living-room player or share with family and friends.

If you're buying media in small quantities, the prices for DVD-R and DVD+R media are about the same: $6 apiece. DVD-R is available in bulk, however, which can cut the price per disc in half.

➤ **REWRITABLE DVD:** Rewritable formats include DVD-RW, DVD+RW, and DVD-RAM. Though the third format is the least compatible of the three (discs can be read only in DVD-RAM drives and some DVD-ROM drives), it's good for data backup, since it's available in both 4.7GB bare discs and high-capacity, 9.4GB cartridges (protected discs that are usable only in other DVD-RAM drives).

The real battle is between DVD-RW and DVD+RW. Both formats burn data and video DVDs that can be read by many (but not all) DVD-ROM drives and set-top DVD players. And both use media that costs about $10 apiece.

Based on their specs, DVD+RW drives are more than twice as fast as DVD-RW drives. DVD+RW drives also take far less time to format rewritable media: A DVD-RW drive requires more than an hour, depending on the software you use. By contrast, a DVD+RW drive formats discs on the fly, so you can start writing to the disc in just a few minutes. You can get software that allows speedier DVD-RW formatting, but neither the Pioneer nor the Benq model listed here includes it.

➤ **INTERFACE:** Internal DVD burners are less expensive than external models, by as much as $100. External drives typically use either the FireWire or USB 2.0 interface; HP is one of the first to offer an external drive, the Dvd200e, with both FireWire and USB 2.0 connectors.

➤ **SOFTWARE:** All drives include video DVD authoring applications, such as Sonic's MyDVD 3.0, to create menus and encode analog video to MPEG-2. All have software for making data DVDs as well. Some vendors, such as HP and Sony, include backup or video editing apps.

Recommendations

BEFORE CHOOSING a format, check the Web site of your DVD player's (or DVD-ROM drive's) manufacturer for media compatibility. DVD+RW's faster format and write speeds give it an edge over DVD-RW. Also consider the strength of the software: For example, HP's Dvd200i includes lots of helpful, easy-to-use apps.

—Melissa J. Perenson ➤

FEATURES COMPARISON

REWRITABLE DVD DRIVE PICKS

	DRIVE	Specs	Comments
1	HP DVD Writer Dvd200i ★★★★☆ July 02 find.pcworld.com/29644	• $450 • 2.4X DVD+R, 2.4X DVD+RW; 12X CD-R, and 10X CD-RW recording speeds • RecordNow and DLA, MyDVD 3.0	Formats +RW media quickly; terrific software bundle includes backup and video-editing utilities. Good for both video and data DVDs.
2	Pioneer DVR-A04 ★★★★☆ June 02 find.pcworld.com/29645	• $340 • 2X DVD-R, 1X DVD-RW, 8X CD-R, and 4X CD-RW recording speeds • RecordNow DX and DLA, MyDVD 3.5	Least expensive drive here, but its performance with -RW media is typically slow, and it has lengthy formatting times. Good for video discs.
3	Sony DRU-120A ★★★★☆ July 02 find.pcworld.com/28322	• $450 • 2.4X DVD+R, 2.4X DVD+RW, 12X CD-R, and 10X CD-RW recording speeds • Recorder Gold and Clip, NeoDVD 3.0	This drive has core hardware similar to the HP Dvd200i. Good software bundle includes backup utility; documentation is thin, though.
4	QPS DVDBurner ★★★☆☆ Aug 02 find.pcworld.com/29646	• $370 • 1X DVD-RAM, 1X DVD-R recording speeds • Instant CD/DVD, NeoDVD 3.0	A good choice for backing up data to 9.4GB high-capacity cartridge media. Lacks CD-R and -RW write support, but can read CD-ROMs.
5	Benq 2108VR-002 DVD-R/RW Writer NEW ★★★☆☆ find.pcworld.com/29996	• $350 • 2X DVD-R, 1X DVD-RW, 8X CD-R, and 4X CD-RW recording speeds • PrimoDVD 2.0, MyDVD 3.0	Documentation is slim, and its software bundle is weak: You'll need to order a free software upgrade from Benq to use rewritable discs.

Visit find.pcworld.com/30173 for more product reviews.

[1] Street prices are reported as of 6/18/02. Speeds for DVD media: 1X = 1.38 MBps; for CD media, CD-R write/CD-RW write, 1X = 150KBps.

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Toshiba Pocket PC e310 | $399

PA3169U-1P05

0% Business Lease $13/mo.[1]
with 0% down, 0 payments for 30 days

At 4.9 oz., the ultra lightweight e310 handheld is also one of the thinnest around. Complete with 32MB of RAM, Microsoft® Pocket PC 2002 software, a 3.5" diagonal TFT color reflective display, built-in voice recorder and USB cradle. Also includes an SD™ expansion slot for additional MP3 and video storage.

Toshiba Pocket PC e740 | $599

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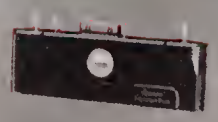
PA3185U-1ETC

e740 High-Capacity Battery | $129.00

Extend the power capabilities of your Pocket PC (e740 only) with a high-capacity lithium ion battery.
PA3197U-1BRL



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Hard Drives

Multiplatter hard drive

WHAT MATTERS: If you work mostly in standard office programs, nearly any drive will do. But speed counts for multimedia authoring.

THE STUNNING CAPACITY of today's hard drives—which doubles every 12 to 18 months—has made it possible, even economical, to turn a PC into a multimedia machine holding gobs of audio and video files. And drives of 200GB or more should be out by the time you read this.

Internal hard drives with Serial ATA connections have thin cables that make more-compact computer designs possible. The technology won't become common for at least another year, however. (See "Your Next Hard Drive" on page 36 for more information.)

Though our tests show that today's hard drives all perform about the same when running regular business applications, people who work with large images and digital video greatly benefit from speedy drives. In our tests with Adobe Photoshop, for example, a system fitted with the fastest drive completed a complex task (applying filters and rotating an image multiple times) almost 30 percent quicker than did the same system with the slowest drive installed. Go to find.pcworld.com/30125 for our complete test results.

Key Features

➤ **CAPACITY:** Today's PC hard drives have at least 20GB of space—about four times the amount you'll need for an operating system, applications, and several years' worth of e-mail messages and documents. The remaining 15GB can hold about 12,000 good-quality, 3-megapixel digital photos or 3750 4-minute MP3 songs encoded at 128 kbps. Capacity really matters for graphic designers and people who edit (or simply archive) video. For example, the contents of a 1-hour MiniDV camcorder tape consume 13GB.

If you want high capacity, remember that PCs usually have room for two hard drives. You may save money by purchasing, say, two 80GB drives instead of a single 160GB unit that sells for a premium.

➤ **ROTATIONAL SPEED:** Current ATA hard drives spin their disks at either 5400 or 7200 revolutions per minute. Usually, but not always, the 7200-rpm drives retrieve data faster. For example, in our tests, the 80GB, 5400-rpm Maxtor DiamondMax D540X copied a 1.2GB file 33 percent faster than the 80GB, 7200-rpm Seagate Barracuda ATA IV. Sometimes other factors, such as the algorithms drives use to retrieve data, can affect performance.

➤ **INTERFACE:** Nearly all desktop PC drives use the parallel ATA interface, supporting maximum transfer rates of either 100 or 133 megabytes per second. But hard drives can't sustain transfer rates fast enough to utilize the extra bandwidth (though they can push out short bursts of data at 100 MBps or greater). And most motherboards don't support ATA/133, so you'll need an add-in card to use it. Fortunately, ATA/133 drives also work with ATA/100 and earlier interfaces.

➤ **BUFFER:** When a system requests data, a hard drive doesn't simply fetch what is requested; it also loads its buffer memory with additional information that the processor is likely to ask for next. We've found that drives with an 8MB buffer tend to perform better on our disk-intensive Photoshop and file-search tests.

Recommendations

CONSIDER A BIG DRIVE (over 40GB) or two smaller drives if you store a lot of digital images and audio, or any quantity of video. If you also edit your images and video, go for high-performance drives—generally 7200-rpm models.

—Seán Captain ▶

FEATURES COMPARISON

TOP HARD DRIVES

TEST Center

	HARD DRIVE (80GB OR OVER)	Specs	Comments
1	Best BUY Western Digital WD800JB ★★★★½ NEW find.pcworld.com/29796	• $160 • 80GB • 7200 rpm, 8MB buffer • ATA/100 interface	Thanks to its extralarge buffer, this drive posted high scores in most tasks and was the fastest in our Photoshop test. It's a good choice for users who want top performance but can do without top capacity.
2	Best BUY Maxtor DiamondMax D540X ★★★★☆ Mar 02 find.pcworld.com/19521	• $190 • 120GB • 5400 rpm, 2MB buffer • ATA/133 interface	Though it's a bit slower than the other drives, the D540X compensates by offering plentiful capacity at a good price. Its cost per gigabyte ($1.58) is the second lowest of all the drives we tested.
3	Western Digital WD1200JB ★★★★½ NEW find.pcworld.com/29795	• $280 • 120GB • 7200 rpm, 8MB buffer • ATA/100 interface	The bigger sibling of our number one Best Buy, this Western Digital was the top overall performer in our tests. With speed and high capacity, this drive is for people who want it all and are willing to pay for it.
4	Western Digital WD1200BB ★★★½☆ Mar 02 find.pcworld.com/19561	• $260 • 120GB • 7200 rpm, 2MB buffer • ATA/100 interface	The WD1200BB is just a bit slower (and cheaper) than its 8MB-buffer-equipped cousin, the WD1200JB. Like the other Western Digital drives on this chart, it includes helpful installation software.
5	IBM Deskstar 120GXP ★★★★☆ Mar 02 find.pcworld.com/19564	• $225 • 123.5GB • 7200 rpm, 2MB buffer • ATA/100 interface	IBM's biggest drive landed in the middle of our test pack overall and took top honors in copying a 1.3GB collection of files. The installation software is confusing and somewhat intimidating for novices.

Street prices are reported as of 6/20/02. Visit find.pcworld.com/30125 for more rankings and reviews.

PHOTOGRAPH: MARC SIMON; ILLUSTRATION: CELIA JOHNSON

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- 256MB of RAM
- 30GB[2] hard disk drive
- DVD-ROM/CD-RW multifunction drive
- 15" TFT active matrix display
- Integrated Ethernet and modem
- Microsoft® Windows® XP Professional

Satellite® 2400-S201 | $1,579
PS240U-00UMR7

0% Business Lease $53/mo.[1]

- Intel® Pentium® 4 Processor 1.60GHz
- 256MB of RAM
- 30GB[2] hard disk drive
- DVD-ROM/CD-RW multifunction drive
- 14.1" TFT active matrix display
- Integrated Ethernet and modem
- Microsoft® Windows® XP Professional

Rich in features but not in price.

Satellite® 1100-S101 | $1,249
PS110U-000G27

0% Business Lease $42/mo.[1]

- Intel® Celeron® processor 1.33GHz
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- 20GB[2] hard disk drive
- DVD-ROM
- 14.1" TFT active matrix display
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Satellite Pro® 6100 | $2,699
PS6100-JM3N89

0% Business Lease $90/mo.[1]

- Mobile Intel® Pentium® 4 Processor 2.00GHz - M
- 512MB of RAM
- 60GB[2] hard disk drive
- DVD-ROM/CD-RW multifunction drive
- 15.0" UXGA active matrix display
- Integrated Ethernet, modem and Wi-Fi
- NVIDIA® GeForce4™ 420 Go graphics controller
- Microsoft® Windows® XP Professional or Windows® 2000 dual linked

Satellite Pro® 6100 | $2,399
PS6100-JHN849

0% Business Lease $80/mo.[1]

- Mobile Intel® Pentium® 4 Processor 1.80GHz - M
- 256MB of RAM
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- 15.0" SXGA+ active matrix display
- Integrated Ethernet, modem and Wi-Fi
- NVIDIA® GeForce4™ 420 Go graphics controller
- Microsoft® Windows® XP Professional or Windows® 2000 dual linked

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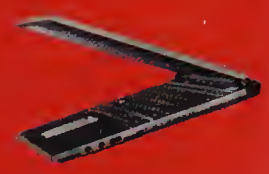

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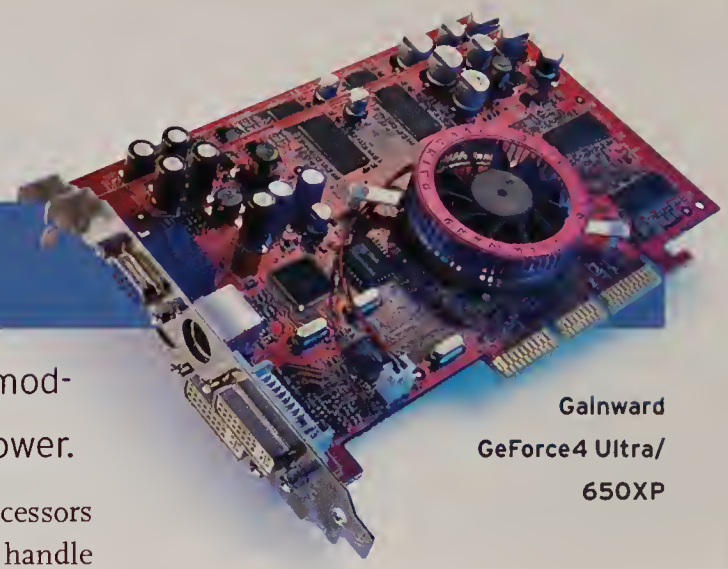
Graphics Boards



Gainward GeForce4 Ultra/650XP

WHAT MATTERS: Budget cards let you play most games at moderate resolutions, but die-hard gamers should opt for more power.

GRAPHICS CHIP AND board makers update their hardware every six months, mainly as a response to consumer demand for more-complex, more-realistic PC games. Titles based on Microsoft's DirectX 8 application programming interface are the most recent spur to upgrade; such games are just appearing now, after almost a year and a half of anticipation. But games aren't the only reason to get a new graphics board. A new card from Matrox, the Parhelia, offers support for up to three displays, and ATI's All-in-Wonder Radeon 8500DV provides FireWire (IEEE 1394) ports, a wireless remote control, and S-Video connections.

Key Features

➤ **GRAPHICS PROCESSOR:** Over the years, graphics processors have taken on more and more of the graphics load from a system's CPU. The graphics processors on today's boards can efficiently handle impressively sophisticated full-motion 3D video that would stump even the most powerful unaided CPU.

Integrated graphics chips typically run at clock speeds of about 166 MHz. Midrange chips, such as those in ATI's Radeon 7500 or NVidia's GeForce4 MX series, run at about 200 to 250 MHz; top-of-the-line cards have chips that run from 270 to 300 MHz. For our October issue, we're testing boards with even faster clock speeds. But don't base your buying decision solely on clock speed: It's only one of many factors that affect performance.

Budget graphics cards, like those based on NVidia's GeForce4 MX chip, do an excellent job with older games at lower resolutions but fall off at higher resolutions (1600 by 1200 at 32-bit color). Most people can't discern differences in frame rates higher than 60 fps; however, boards that can produce faster frame rates at a midrange resolution will typically sustain playable frame rates at higher resolutions, and usually can handle more-complicated games. To play DirectX 8 games, you'll get the best performance from a chip that supports DirectX 8 hardware acceleration; NVidia's GeForce4 Titanium (Ti) and ATI's Radeon 8500 chips are solid choices. Other manufacturers, such as SIS and Matrox, are getting into the game with their own DirectX 8 cards as well.

➤ **MEMORY:** When you perform such graphics-intensive activities as playing games and editing video, the information necessary to display images is buffered in RAM on the card (unless you're using integrated graphics, in which case images are stored in main memory).

Integrated graphics chips reduce the amount of RAM available to the rest of the system. Less-expensive computers with lower-powered CPUs, such as Intel's Celeron, often have integrated graphics subsystems. Though PCs that use integrated chips do an acceptable job with typical business applications, most lack the extra memory necessary for 3D gaming, so they aren't suitable for playing any but 2D games. And they often omit an AGP (Accelerated Graphics Port) slot for holding an upgrade card; if a system does have an AGP slot—designed to provide a fast graphics interface to move 3D data between your graphics processor and main system memory—you can generally disable the integrated graphics and insert a more-powerful graphics add-in card.

Integrated chips are evolving, though: NVidia's NForce system chip set integrates a GeForce2 MX graphics chip and,

CLOSE-UP

WHAT DOES ANTIALIASING DO?

FULL-SCENE ANTIALIASING (FSAA) softens the jagged edges that can appear at lower resolutions—where individual pixels are large—by blending pixels together to give the appearance of a smooth, high-resolution image. The two scenes below are both screen shots from NovaLogic's Comanche 4 game running at 1024 by 768 using 32-bit color; one image shows the game running with FSAA turned off, the other with it turned on.

Without full-scene antialiasing

At this resolution, large pixels cause jagged edges on the hill. The five boards we tested with FSAA took a performance hit (albeit a minor one) in our tests.

With full-scene antialiasing

FSAA smooths out large pixels and eliminates "jaggies." Notice that the rough edges of the once-jagged hillside are now softened with FSAA enabled.

in many cases, 32MB of dedicated memory. As a result, Athlon-based computers that employ the NForce chip are capable of handling multimedia tasks better than PCs using many other integrated graphics chips. (Visit find.pcworld.com/30170 for a list of vendors that offer systems with NVidia's NForce chip.)

The more complicated the game or image you're viewing, the more video memory you'll need. Budget graphics cards typically come with 32MB to 64MB of DDR SDRAM, while more-expensive models offer 64MB to 128MB. For older games like Quake III, 32MB is sufficient. That amount isn't likely to deliver good image quality and high frame rates with new, advanced games or at resolutions above 1600 by 1200, however. For higher resolutions and more-complex games such as Comanche 4 or Unreal Tournament 2003, get a card with at least 64MB of video memory. And though most of today's games don't require more than that, you may want to opt for 128MB rather than face upgrading again when even more memory-intensive games arrive.

Some cards include extra features, as well as bundled hardware and software. The following are some of the more common options that board vendors offer.

➤ **DUAL DISPLAY OR DUAL HEAD:** To connect your computer to a second digital or analog monitor or to a TV, you'll need a graphics card with extra ports and additional RAMDACs (chips that convert digital information to analog signals) to drive two—or even three—separate displays. If any of your monitors is digital, to connect it you'll need either a DVI-out port on the card or a DVI adapter.

➤ **S-VIDEO-OUT/-IN:** The S-Video-out port allows you to send video signals to a TV, a VCR, or another entertainment device. The S-Video-in port lets you bring video into your PC from a camcorder, a VCR, or the like.

➤ **COMPOSITE-OUT/-IN:** Composite ports fulfill the same function as S-Video ports, and they are particularly handy for use with older devices that may lack S-Video ports. Many graphics boards that provide S-Video ports also include an S-Video-to-composite adapter cable.

➤ **OVERCLOCKING:** Running a graphics processor faster than the manufacturer's specified speed is popular among PC tweakers and dedicated gamers. While this can squeeze a bit more performance out of a card, it carries risks such as overheating. Some vendors—Gainward is one—sell cards that have already been overclocked; some bundle overclocking software with cards. Be sure to read the manufacturer's recommendations and instructions before overclocking.

➤ **ANTIALIASING:** Many cards offer full-scene antialiasing (FSAA), which smooths and softens the jagged edges of images. This feature is especially helpful when the board is running at lower resolutions. Enabling it can lower frame rates, though, so gamers must choose between smoother images and faster performance.

The more complicated the game or image you're viewing, the more video memory you'll need.

FEATURES COMPARISON

TOP GRAPHICS BOARDS

TEST Center

	POWER GRAPHICS BOARD	Specs	Comments
1	Best BUY Gainward GeForce4 Ultra/650XP NEW ★★★★☆ find.pcworld.com/30143	• $199 • NVidia GeForce4 Ti 4200 chip • 128MB of DDR SDRAM, DVI-out, S-Video-in and -out, composite-in and -out	Inexpensive card offers stellar image quality, but speed scores were slightly slower than those from more-expensive NVidia 4400- and 4600-based cards.
2	Best BUY VisionTek Xtasy GeForce4 Ti 4400 ★★★★½ July 02 find.pcworld.com/28361	• $250 • NVidia GeForce4 Ti 4400 chip • 128MB of DDR SDRAM, DVI-out, S-Video-out	Board was almost as fast as GeForce4 Ti 4600-based cards (which fared slightly better in our speed and image-quality tests), but it's priced considerably lower.
3	PNY Verto GeForce4 Ti 4600 ★★★★☆ July 02 find.pcworld.com/28362	• $370 • NVidia GeForce4 Ti 4600 chip • 128MB of DDR SDRAM, DVI-out, S-Video-out	The fastest card here beat EVGA's card by a hair in our speed tests. PNY offers a lifetime replacement warranty and toll-free support for 10 hours on weekdays.
4	EVGA E-GeForce4 Ti 4600 NEW ★★★½☆ find.pcworld.com/30146	• $380 • NVidia GeForce4 Ti 4600 chip • 128MB of DDR SDRAM, DVI-out, S-Video-out, composite-out	A composite-out port lets you hook your system up to a TV. The board delivers fast performance and great image quality, but it's difficult to install.
5	Hercules 3D Prophet FDX 8500 LE ★★★☆☆ July 02 find.pcworld.com/28381	• $169 • ATI Radeon 8500LE chip • 64MB of DDR SDRAM, DVI-out, S-Video-out, composite-out	The least-expensive card here offers fast frame rates and a generous selection of ports. However, games looked dark, and a couple of them lacked contrast.

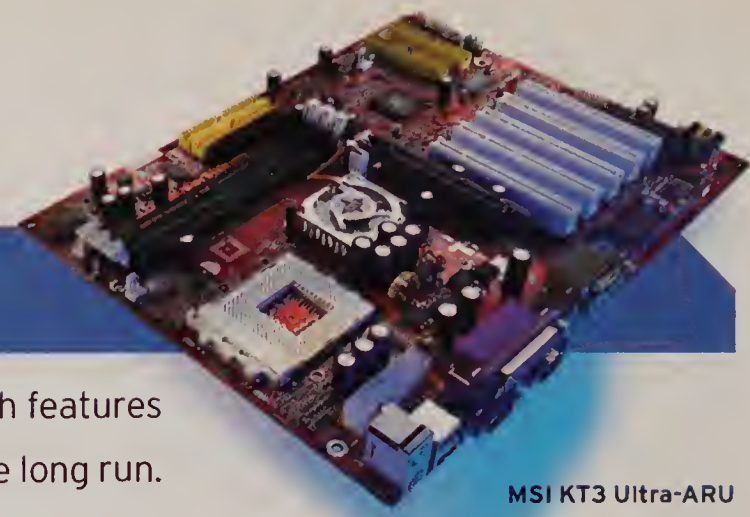
Street prices are reported as of 7/2/02. Visit find.pcworld.com/30113 for more rankings and reviews.

Recommendations

DEDICATED GAMERS who want to play new games at the highest resolutions and color depths will get the best performance from a board with the latest graphics chip set—one that offers hardware acceleration support for Microsoft's DirectX 8 API and comes with at least 64MB of DDR SDRAM. A graphics card based on NVidia's GeForce4 Ti 4600 or ATI's Radeon 8500 chip is a good bet. If you're a casual gamer who doesn't play the most recent titles, consider purchasing a budget card that uses NVidia's GeForce4 MX chip, such as VisionTek's Xtasy GeForce4 MX 440, or one from ATI's Radeon 7500 line. Faster graphics cards with new features, new chip sets, and more memory are on the way and might be on store shelves by the time you read this. Visit find.pcworld.com/30107 for additional information on buying graphics boards.

—Alexandra Krasne ▶

Motherboards



MSI KT3 Ultra-ARU

WHAT MATTERS: Spending extra for a motherboard with features like USB 2.0 ports and IDE RAID can save you money in the long run.

WHETHER YOU'RE BUILDING a new PC or overhauling an old one, a new motherboard is the place to start. And with boards packing extras like FireWire (IEEE 1394) and USB 2.0 ports, six-channel sound chips, and RAID controllers, you might not need to add much else.

The choice of motherboard you make determines the RAM and CPU types you can use, so you must look at those three critical components together. You can spend as little as $180 total on the trio and get by, but for that amount you're practically buying obsolescence. Plan on spending between $400 and $700 for a capable midrange setup. From there you can narrow the available choices according to your preference for AMD or Intel processors (if you have one), or you can just look for the best value in your price range.

And though you may not need a RAID controller or a LAN connection now, getting those extras on a full-featured board like Soyo's KT333 Dragon Ultra will save you money if you need them later.

Key Features

➤ **CHIP SET:** A motherboard's chip set performs such vital functions as routing data from hard drive to memory to CPU, and ensuring that your peripherals and expansion cards can communicate. The chip set limits the CPU types and speeds the board can take, the type of RAM you can install, and (to a degree) whether extras like integrated graphics, sound, and USB 2.0 ports can be included with the board.

Manufacturers base their motherboards around the chip sets they use, adding features like RAID controllers and FireWire ports to differentiate their boards. That's why knowing the vital stats (CPU and memory support, IDE controller speed, and whether sound and graphics are integrated) of the chip sets you're considering can help you pinpoint differences between otherwise very similar motherboards.

Popular Intel Pentium 4 chip sets include Intel's 850E, 845E, and 845G; Via's P4X333; and SIS's 650 and 645DX. (Head to find.pcworld.com/29975 for more on what each chip set supports). The latest AMD Athlon XP+ chip sets include Via's KT333A, SIS's 745, NVidia's NForce, and ATI's Radeon IGP. (See find.pcworld.com/29978 for more details.)

➤ **CPU:** Pentium 4 and Athlon XP are your main choices. We tested several motherboards based on different chip

FEATURES COMPARISON

MOTHERBOARD PICKS

		MOTHERBOARD	Specs	Tested CPU	PC WorldBench 4 score	Board price/combo price[1]	Comments
1	Intel Pentium 4	VPSD P4PB ★★★★½ NEW find.pcworld.com/30176	Via Apollo P4333 chip set, DDR333 RAM, ATA/133 and RAID, USB 2.0	2-GHz P4	115	$105/$398	This speedy, full-featured board from Via subsidiary VPSD proved easy to set up. Its low price makes it an outstanding value among Pentium 4 motherboards.
				2.53-GHz P4	123	$105/$854	
2	Intel Pentium 4	MSI 845E MAX2 ★★★★☆ NEW find.pcworld.com/30177	Intel B45E chip set, DDR266 RAM, ATA/100 and RAID, USB 2.0, LAN	2-GHz P4	112	$124/$417	MSI packs useful features onto this affordable 845E motherboard. It includes optional brackets that hold digital sound connections, status indicator lights, and extra USB ports.
				2.53-GHz P4	119	$124/$873	
3	Intel Pentium 4	Intel D850EMV2 ★★★☆☆ NEW find.pcworld.com/30178	Intel B50E chip set, PC1066 RDRAM, ATA/100, USB 1.1	2-GHz P4	112	$154/$525	This bare-bones model pairs the fastest P4 chips with RDRAM. Look for full-featured B50E boards from vendors such as Abit, A-Open, Asus, Epox, Gigabyte, and MSI.
				2.53-GHz P4	116	$154/$981	
1	AMD Athlon XP	Soyo KT333 Dragon Ultra ★★★★½ NEW find.pcworld.com/30179	Via KT333 chip set, DDR333 RAM, ATA/133 and RAID, USB 2.0, LAN	Athlon XP 1700+	117	$155/$347	Soyo's motherboard offers great performance plus extras like digital audio connectors and a 3.5-inch drive-style enclosure holding front USB ports and a LAN indicator light.
				Athlon XP 2100+	121	$155/$448	
2	AMD Athlon XP	Asus A7N 266-E ★★★½☆ NEW find.pcworld.com/30180	NVidia NForce 420 chip set, DDR266 RAM, ATA/100, USB 1.1, LAN	Athlon XP 1700+	115	$150/$322	Integrated GeForce2 graphics and a sound processor with a Dolby Digital encoder are nice, but they make NForce 420 boards costly if you plan to add sound and graphics cards.
				Athlon XP 2100+	119	$150/$423	

Visit find.pcworld.com/30181 for more information.

All motherboards were tested under Windows XP Home on systems with 256MB of RAM, a VisionTek GeForce4 Ti 4600 graphics board, a Lite-On 40X/12X/48X CD-RW drive, and an IBM Deskstar 120GXP hard drive. [1] Street prices are reported as of 7/15/02. Combo price includes the motherboard, tested CPU, and 256MB of the appropriate RAM type.

sets with both a high-end and a low-end CPU. In most business applications, we found little difference between systems using the fastest Athlon and P4 chips, though we did see a big price difference. At press time the fastest P4 chip, clocked at 2.53 GHz and running on a 533-MHz bus, sold for around $650, while the speediest Athlon XP chip cost $200. That may change later this year as P4 chips widen their MHz lead over Athlons and the new, faster chips push today's speed champs down to more affordable prices.

Celeron CPUs are available as low-price alternatives to P4s, and some Durons can still be found as Athlon XP substitutes, but large performance drops usually accompany the small cost savings (see find.pcworld.com/29972 for details).

➤ **RAM:** Most boards use DDR SDRAM, though a few P4 chip sets require Rambus memory (RDRAM). DDR memory is available in a variety of speeds; you should generally buy the fastest your board allows. Motherboard manufacturers list DDR memory types according to their clock speed or bandwidth, along with other notations. From slowest to fastest, the types are: DDR200 (aka PC1600), DDR266 (PC2100), DDR333 (PC2700), and the upcoming DDR400 (PC3200).

RDRAM is available only on boards equipped with Intel's 850 or 850E chip sets, and it must be installed in pairs. Free memory slots must be filled with continuity modules (CRIMMs). RDRAM costs about twice as much as DDR memory, but it can be useful in high-bandwidth applications. RDRAM is currently available in two speeds: PC800 and PC1066. Spring for the swifter PC1066 (and a motherboard with a chip set supporting it) if you're purchasing a Pentium 4 that runs on the 533-MHz bus.

➤ **SOUND AND GRAPHICS:** Motherboards with integrated sound have become so common that it's hard to find one without it. The latest models sport six-channel digital sound chips that are more than adequate for casual gaming and MP3 playback. If you're adding a sound card, disable the integrated sound with a jumper or a BIOS setting.

NVidia's NForce, ATI's Radeon IGP, and Intel's 845G chip sets integrate adequate graphics processing. If you plan to run the latest 3D games, though, you should either avoid integrated chip sets or make sure your motherboard includes an AGP slot so you can add a graphics card.

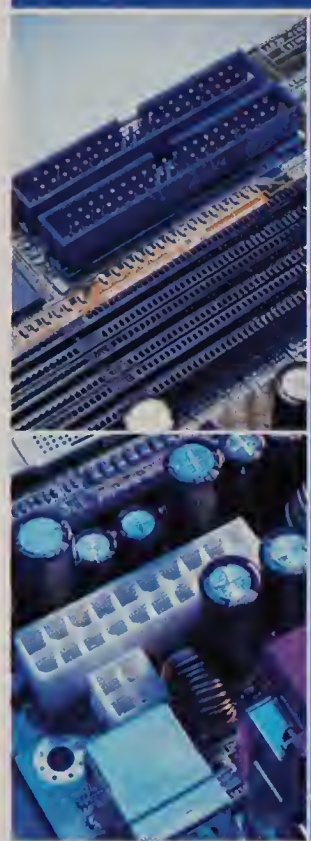
➤ **STORAGE:** Most motherboards ship with an IDE controller that supports ATA/100 or ATA/133 drives. The performance difference between these two standards is negligible, however, so the decision you make here isn't a huge issue.

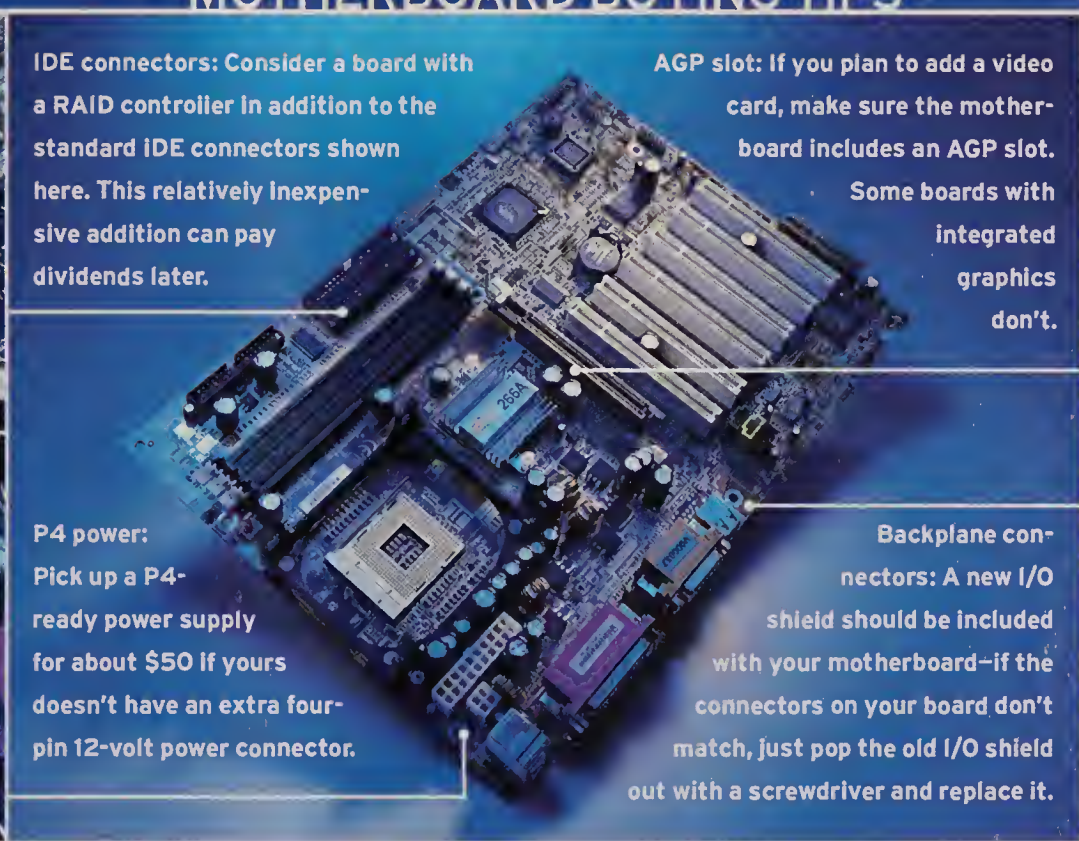
Boards with IDE RAID support present a more interesting choice. A RAID system uses a pair of identical hard disks to increase performance or provide redundancy in case a drive fails. These days, RAID-equipped boards cost as little as $8 more than their RAID-free counterparts.

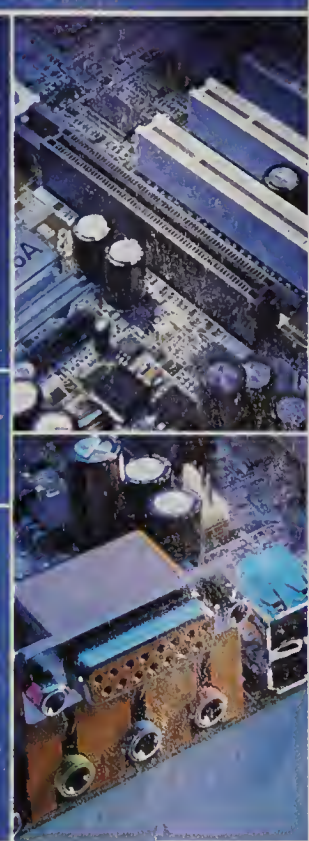
➤ **CONNECTIONS:** Many motherboards offer ethernet, USB 2.0, and FireWire ports. So-called legacy-free boards ship without PS/2, serial, and parallel ports.

CLOSE-UP

MOTHERBOARD BUYING TIPS







IDE connectors: Consider a board with a RAID controller in addition to the standard IDE connectors shown here. This relatively inexpensive addition can pay dividends later.

AGP slot: If you plan to add a video card, make sure the motherboard includes an AGP slot. Some boards with integrated graphics don't.

P4 power: Pick up a P4-ready power supply for about $50 if yours doesn't have an extra four-pin 12-volt power connector.

Backplane connectors: A new I/O shield should be included with your motherboard—if the connectors on your board don't match, just pop the old I/O shield out with a screwdriver and replace it.

Recommendations

IF YOU WANT the best value, an inexpensive board with a midrange Athlon CPU is probably the right choice. Look to P4 boards such as the VPSD P4PB we tested if you intend to tackle tasks like video editing, but be prepared to shell out some serious cash for the fastest P4 CPUs.

—Eric Dahl ▶

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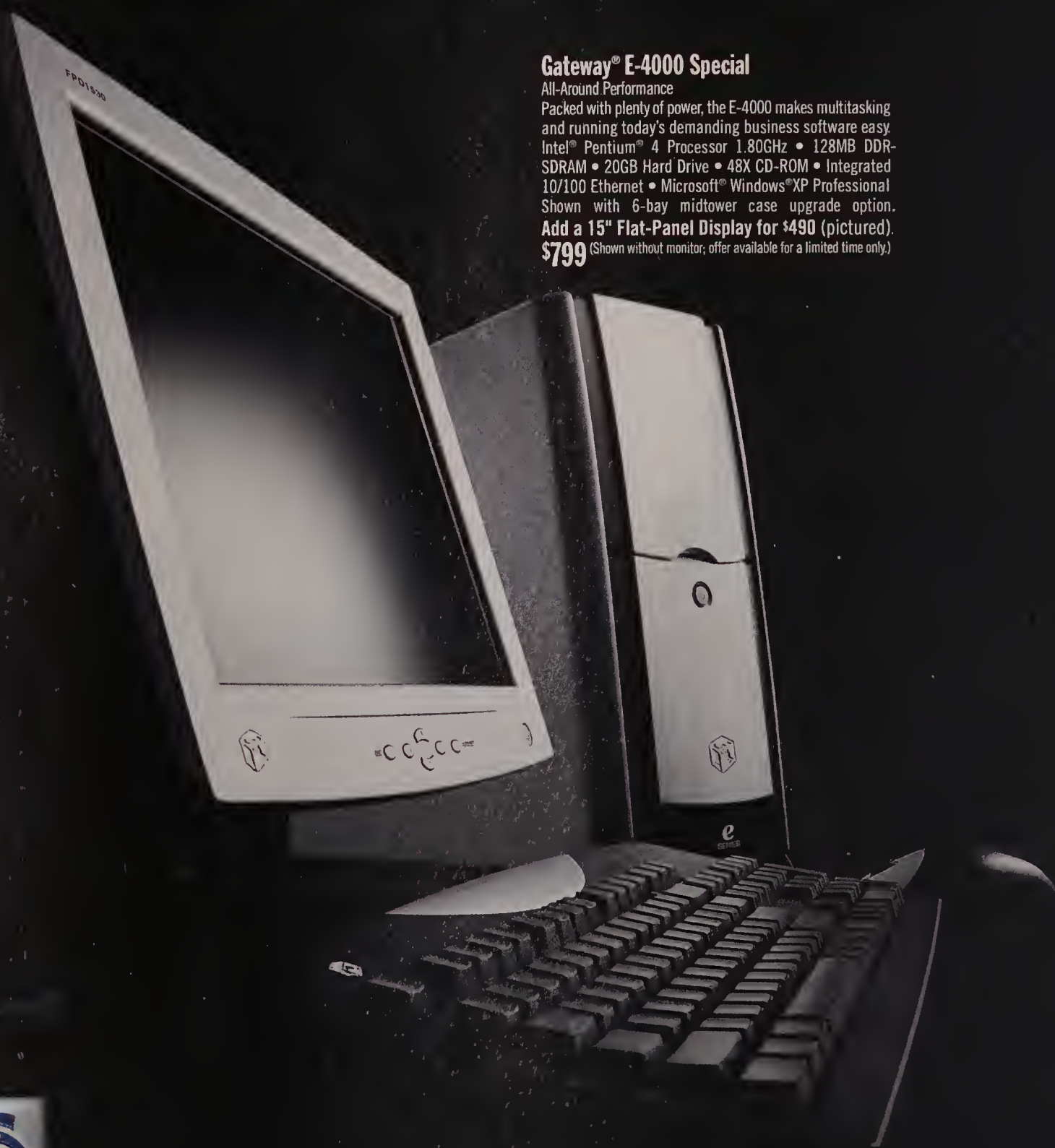

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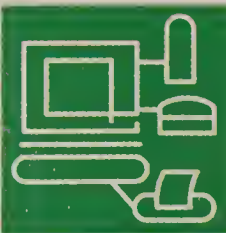

Outside the Box

Get the most out of your system by installing home networking gear, picking a broadband provider, or purchasing the right printer, monitor, or scanner.

Home Networking Gear

WHAT MATTERS: Wired and wireless choices abound, and prices are falling. Selecting the right type of network (or a hybrid) is key.

Agere Orinoco Wi-Fi line

IN GENERAL, a wireless home network offers more convenience than wired ones: You don't need to install cables, and notebook users can roam untethered. But wired networks are more secure and reliable, and using existing home wiring—either phone lines (HomePNA) or electrical wiring (HomePlug)—eliminates the expense and hassle of installing new cables. Combining elements of both types of networks is easy if you plan ahead.

Prices for networking gear based on the popular 11-megabits-per-second 802.11b (or Wi-Fi) wireless standard have plummeted in the past year, and Wi-Fi's 54-mbps sibling, 802.11a (Wi-Fi5), has arrived. On the wired side, the long-awaited HomePlug standard—which transfers data over existing electrical lines—has debuted, and 1-gigabit-per-second (1000-mbps) ethernet is starting to appear on desktops. As is usual with new technologies, initial prices for Wi-Fi5, HomePlug, and (especially) gigabit-ethernet products have been high. Expect price reductions as more vendors offer these products.

Also new: wireless access points (bridges that connect wireless networks to wired ones) that can communicate with both Wi-Fi5 and Wi-Fi adapters. Such products will appeal primarily to businesses that want to migrate to Wi-Fi5 without either stranding legacy 802.11b users or having to install two access points to serve the two camps. Even more recently, D-Link, U.S. Robotics, and other vendors have introduced so-called 802.11b-plus products based on a new Texas Instruments chip designed to improve network performance while maintaining compatibility with conventional Wi-Fi equipment. Our informal tests show that these products can boost speeds by up to 50 percent—but the increase is largely lost if even one conventional Wi-Fi adapter is on the network. (For our look at both technological advances, see *New Products*, page 70.)

FEATURES COMPARISON

WI-FI ROUTER PICKS

	WIRELESS GATEWAY	Specs	Comments
1	Agere Orinoco BG-2000 ★★★★½ NEW find.pcworld.com/29999	• $160 • One LAN ethernet port • Extended range • One-year warranty	Orinoco's new gateway boasts idiot-proof installation and top performance in every room of our test house.
2	D-Link AirPlus DI-614+ Wireless Router ★★★★½ NEW find.pcworld.com/30003	• $125 • Four LAN ethernet ports • 22-mbps mode • Three-year warranty	The D-Link AirPlus offers a 22-mbps mode, 256-bit encryption, and extensive firewall configuration options. Installation can be tricky, however.
3	NetGear Cable/DSL Wireless Router (MR314) ★★★★☆ NEW find.pcworld.com/30000	• $120 • Four LAN ethernet ports • Parental controls • Five-year warranty	The NetGear provides a great combination of deep firewall features and very good performance. It also comes with a generous five-year warranty.
4	Linksys EtherFast Wireless Access Point + Cable/DSL Router w/4-Port Switch ★★★★☆ May 02 find.pcworld.com/30001	• $145 • Four LAN ethernet ports • Uplink port • One-year warranty	A reliable workhorse, the Linksys sets up in no time, yet has extensive firewall configuration capabilities.
5	SMC Barricade Wireless Broadband Router (SMC7004AWBR) ★★★☆☆ NEW find.pcworld.com/30004	• $145 • Three LAN ethernet ports • Print server • 90-day warranty	The SMC Barricade delivers excellent performance and offers a useful print server, but it was difficult to install and often lost connection to our DSL line.

Street prices are reported as of 7/8/02. Visit find.pcworld.com/30155 for product reviews.

Key Features

➤ **NETWORK TYPE:** The flexibility of a wireless network is especially tempting, and if you go with a network based on the popular 802.11b standard, you can use your portable in a growing number of public spaces that offer Wi-Fi Internet access. But the security algorithm built into both Wi-Fi and Wi-Fi5 is vulnerable to attack, and range limitations can make using a pure wireless network impractical in spaces that are larger, occupy several floors, or contain lots of doors and walls.

Ethernet remains the fastest, cheapest,

and most secure wired technology available; but installing the required Category 5 cabling can be costly and messy. Consequently, most home users are better off with HomePNA or HomePlug networks. HomePlug has greater appeal because homes and offices tend to have more power outlets than phone jacks. On the other hand, however, at this writing HomePlug adapters cost two to three times as much as HomePNA adapters.

➤ **SPEED AND RANGE:** If you plan to use your network primarily for sharing broadband Internet access, the speed limitations of your networking technology won't matter much: All of the popular standards significantly exceed the top speed (1 to 1.5 mbps) of residential DSL or cable service. If you plan on frequently moving large files between computers, though, you'll appreciate the difference between a fast network and a slow one.

Today's 10/100-mbps ethernet networks are the fastest in widespread use. The fastest wireless standard is Wi-Fi5, rated at 54 mbps, but components can cost up to twice as much as their Wi-Fi counterparts. Lagging considerably behind Wi-Fi5 are HomePlug (14 mbps), Wi-Fi (11 mbps) and HomePNA 2.0 (10 mbps). For any of these products, however, you should expect real-world throughput to be less than half the theoretical speeds. In addition, with wireless protocols, speed deteriorates rapidly as distance from the access point increases or as obstacles such as doors, walls, and ceilings intervene. Though many Wi-Fi and Wi-Fi5 vendors claim a range of up to 300 feet, don't count on achieving a range of more than about 100 to 125 feet in a typical office, and somewhat less in a home.

➤ **SECURITY:** Because intruders don't have to plug in to a physical port for direct access, as they do with a wired network, wireless networks are especially vulnerable to attack. Designers intended the encryption algorithm built into the 802.11*x* spec, called Wired Equivalent Privacy (WEP), to function as effectively as the physical barrier in a wired network. But encryption experts have shown WEP to be weak on security (though improvements are coming in the form of the IEEE's 802.11i spec). You can improve your odds with network adapters that support 128-bit encryption (versus the 40-bit encryption of basic wireless cards). But if security is vital to you, we recommend using a virtual private network and/or firewall, whether your network is wired or not.

➤ **HARDWARE SUPPORT:** Not all types of network components are available ▶

CLOSE-UP

NO- NEW-WIRES NETWORKS AT A GLANCE

PROVIDER	Wi-Fi5 (802.11a)	Wi-Fi (802.11b)	HomePlug	HomePNA
Type	Wireless (5-GHz band)	Wireless (2.4-GHz band)	AC electrical wires	Phone wires
Rated speed (mbps)	54	11	14	10
Real-world speed [1] (mbps)	13.1	4.1	5.2	4
Street price: PC Card	$110–$150	$70–$110	n/a	$50–$60
Street price: USB 1.1 adapter	n/a [2]	$70–$145	$150–$180	$55–$60
Street price: Router/access point or bridge	$225–$300 [3]	$135–$150	$80–$130 [4]	$150–$180 [4]
Pros	Fastest wireless technology	Affordable wireless networking that's fast enough for sharing broadband Internet access.	Reliable access that's slightly faster than Wi-Fi wireless and not subject to interference from walls and from other wireless technologies.	Most inexpensive home networking technology, if you don't have to buy a bridge and router.
Cons	Pricey (especially if you have to buy a router). No USB desktop adapter or router/gateway combo yet available. Weak security.	Slow for large file transfers between networked computers. Slows down or disappears in obstructed spaces. Can be subject to interference from other devices (cordless phones, microwave ovens) that use the 2.4-GHz band. Weak security.	Slow for large file transfers between networked computers. Pricier than Wi-Fi (especially if you have to buy a router). No PC Card adapters are available, and bulky USB and ethernet adapters are cumbersome for notebook users.	Works with standard RJ-11 phone jacks, which may be in short supply in your home or office. Might not work with older wiring. Slower than Wi-Fi or HomePlug. Costs mount if you have to buy a router.
Bottom line	Best for corporate settings where multiple notebook users require high-speed access to existing networks.	Solid mainstream technology for Internet sharing and light file transfers in smaller, unobstructed spaces where security is not of vital concern.	A good candidate for wired desktops on a hybrid wired/wireless network.	A viable choice only if every penny counts. Many observers expect HomePNA to fade as other technologies become cheaper.

n/a = Not applicable.

[1] Based on informal tests conducted with PCs in adjacent rooms, about 40 feet apart. For wireless technologies, speed deteriorates severely at outer limit of range.

[2] 802.11a PCI card adapter available for $150–$210.

[3] Access point only; router required to share Internet access with multiple PCs.

[4] Ethernet bridge only; router required to share Internet access with multiple PCs.

for each network technology. For example, while several Wi-Fi residential gateways combine the access point and router required to share a single broadband Internet account, no comparable product has yet shipped for Wi-Fi5. You have to plug a Wi-Fi5 access point into a conventional ethernet router to gain Internet access. And because the first wave of Wi-Fi5 products are aimed primarily at companies that want to afford notebook users access to a wired network, the first Wi-Fi5 desktop adapters appeared only recently.

Similarly, at this writing, no vendor offers a HomePlug gateway or PC Card. And because the available adapters are bulky bricklike units that plug into an ethernet or USB port, the standard is poorly suited for use with notebooks.

➤ **FIREWALL FEATURES:** If you use a router or gateway to connect your network to the Internet, it will likely include a built-in firewall to ward off intruders. But the configurability of these firewalls varies widely. Some make connecting directly to a designated PC on your network easy for authorized applications—useful for certain videoconferencing and message applications, not to mention online games. If you have a static IP address, some gateways will even help you set up a Web server. Others offer parental controls, allowing you to block access to sites by URL or even by specific keywords.

➤ **ROOM TO GROW:** Your networking needs may well increase as new applications (connecting to home entertainment devices, for example) arrive. Look for gear that allows you to add devices or network types. If you decide to buy a wireless residential gateway, for example, choose one with multiple local-area network (LAN) ethernet ports, which will enable you to create a hybrid wired-and-wireless network. If you'd like to use a printer over your network without hooking it up to an always-on PC, get a gateway with a built-in print server (you connect the printer to a port on the gateway). Want wireless access for employees in a growing office? Consider Wi-Fi5, which supports many more simultaneous users than Wi-Fi.

> Most home users will be best off with either a Wi-Fi network or a Wi-Fi/HomePlug hybrid.

Recommendations

KEY FACTORS IN choosing a home network include the types and physical locations of your computers, your security needs, and the cost you can afford. Unless large file transfers are involved, most home users are best off with a Wi-Fi network or—if a pure wireless network is impractical—a Wi-Fi/HomePlug hybrid.

Because Wi-Fi shoppers have the most options, our chart of top router picks is devoted to Wi-Fi. If you're willing to spend a few extra dollars for top range and speed, consider a solid and consistent performer such as Agere's Orinoco line.

—Yardena Arar ▶

DECISION STEPS

WHICH HOME NETWORK WORKS FOR YOU?

IF THIS IS YOUR SITUATION:	AND:	THEN BUY:
You don't mind installing Category 5 wiring to connect the PCs and other devices on your network (all other options don't entail new wiring).	Security, speed, and hardware costs are of vital concern.	Ethernet cabling and ethernet PCI, USB, or PC Card adapters for each desktop and notebook—this option is the cheapest, fastest, and most secure.
You can install a wireless access point/gateway that lies no farther than 100 to 125 feet from any of your PCs (less if walls, ceilings, or doors intervene).	Security and speed aren't of vital concern, and you don't expect more than a handful of users at any given time.	An 802.11b gateway (preferably equipped with several additional ethernet ports), an 802.11b PC Card for each notebook, and an 802.11b PCI or USB adapter for each desktop.
You already have a wired network, but you want notebook users to be able to roam around and still connect to the network as needed.	Security and cost aren't of vital concern, but network speed and support for multiple users are important.	One or more Wi-Fi5 (802.11a) access points (depending on the size of the space to be covered) and a Wi-Fi5 PC Card for each notebook.
Your PCs are more than 100 to 200 feet apart, or they're separated by walls, doors, and/or ceilings.	Cost isn't of vital concern, and you aren't networking a notebook.	An ethernet router, a HomePlug ethernet bridge for the router, and a HomePlug ethernet bridge (requires ethernet adapter) or a USB adapter for each desktop.
Your PCs are far apart or are separated by walls, doors, and/or ceilings.	Cost is of vital concern, and your PCs are located reasonably close to available phone jacks.	An ethernet router, a HomePNA ethernet bridge for the router, a HomePNA PC Card for each notebook, and a HomePNA PCI or USB adapter for each desktop.
Your space is too large or obstructed to support a pure wireless network.	You'd like to be able to roam with a notebook.	A wireless/wired hybrid. For example, a Wi-Fi router with additional ethernet ports, a HomePlug ethernet bridge for the router, a HomePlug ethernet bridge (requires ethernet adapter) or USB adapter for each desktop, and a Wi-Fi PC Card for the notebook.

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These new SuperLite™ models both employ Sony LCD technology delivering SVGA resolution (1800 ANSI lumens*) in the VPL-CS5, and true XGA resolution (2000 ANSI lumens) in the VPL-CX5. Best of all, they're amazingly affordable.

The VPL-CS5/CX5. If you're going to have only one projector, you'll be glad you chose a Sony.

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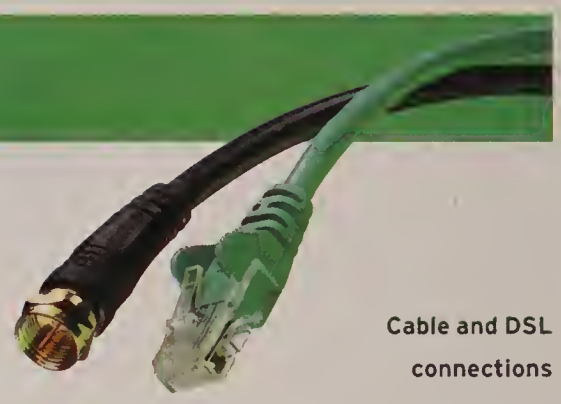
*ANSI lumen is a measuring method of the American National Standards Institute IT7.228

Broadband

WHAT MATTERS: Cable Internet costs the least, but you should choose DSL if you plan to share access among multiple PCs.



Cable and DSL connections

ONCE YOU'VE SWITCHED to a high-speed Internet connection, it's hard to go back to dial-up. Instant connections and file downloads in seconds instead of minutes can change computing life as you know it. Here's a look at how much a high-speed setup will cost, what kind of performance you can expect to get, and what services each type of broadband provides.

Key Features

➤ **PRICE:** DSL service fees range from $40 to $600 per month (the higher-price options include services for small businesses and faster upload and download speeds); residential services cost about $45 a month. DSL vendors usually provide the DSL modem. Installation costs from $50 to $400, though providers may waive or discount installation fees if you accept a one- or two-year service contract.

Cable data services cost from $25 to $95 per month; residential rates sit at the low end of the scale, and the higher fees are for faster upload and download speeds. You can buy your own cable modem for about $100 or rent one from your vendor for between $3 and $7 a month. Installation costs from $50 to $150; but like DSL services, cable companies may waive or discount these fees during promotions, which often involve an extended contract.

For satellite service you'll pay about $60 to $70 a month. The equipment and installation cost about $600.

➤ **DOWNLOAD/UPLOAD SPEED:** Though a DSL connection can theoretically run at speeds as high as 10 mbps, most services offered to homes and small businesses provide download and upload speeds of 128 kbps to 1.5 mbps (roughly 2 to 25 times faster than a 56-kbps modem).

Download rates for cable start at about 1.5 mbps, whereas download speeds for entry-level DSL tend to fall well below 1 mbps. Upload speeds for cable range between 128 kbps and 384 kbps.

Satellite download speeds range from 400 kbps to 3 mbps, and upload speeds run about 128 kbps. But there's one big caveat: Satellite broadband incurs high latency—the time it takes for the signal to travel to and from the orbiting satellite—making it a bad choice for online gaming.

➤ **CHOICE OF SERVICES:** As with dial-up, you need an account with an ISP to complete your broadband connection. Many ISPs partner with DSL providers to offer various speed and service packages. Cable companies, on the other hand, can dictate most terms of service because they are usually the only providers in a given area. For example, AT&T Broadband's standard service agreements prohibit customers from running servers, and sharing connections among a home network of multiple PCs is another no-no, unless you pay extra. The company reserves the right to probe your system to make sure you're following its rules. DSL typically carries far fewer use restrictions, so it's a better choice if you do anything more than connect a single PC to the Internet for browsing, e-mail, and downloading.

Recommendations

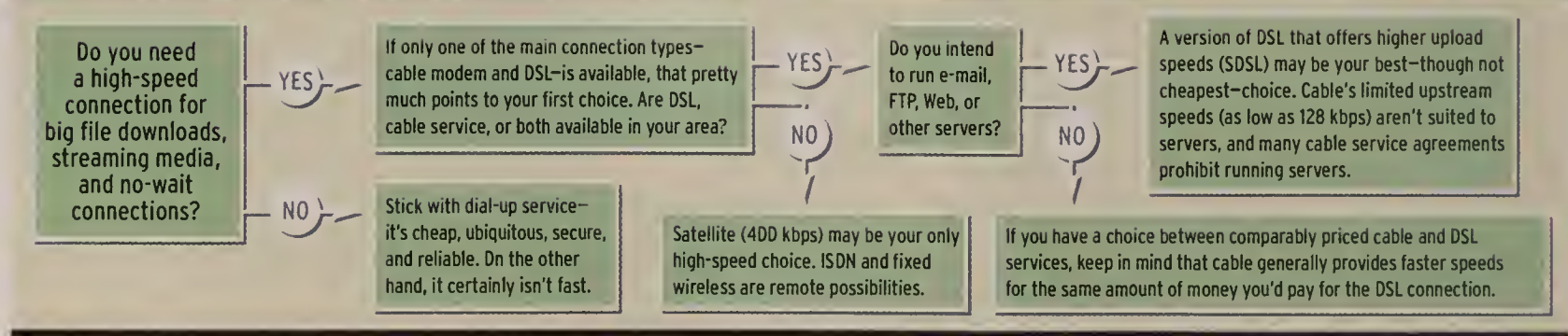
IF YOUR INTERNET activity is limited to e-mail and occasional Web browsing, broadband may not be worth the extra cost. But if you're ready to move to broadband, and you like your dial-up ISP, check with it first—you might keep your e-mail address. If you simply want a faster connection, cable usually offers more speed for the money. A DSL line typically has more business-friendly features. Stuck in the wilderness? Then you're probably stuck with satellite, but keep checking for the availability of the other services.

—Scott Spanbauer ▶

DECISION STEPS

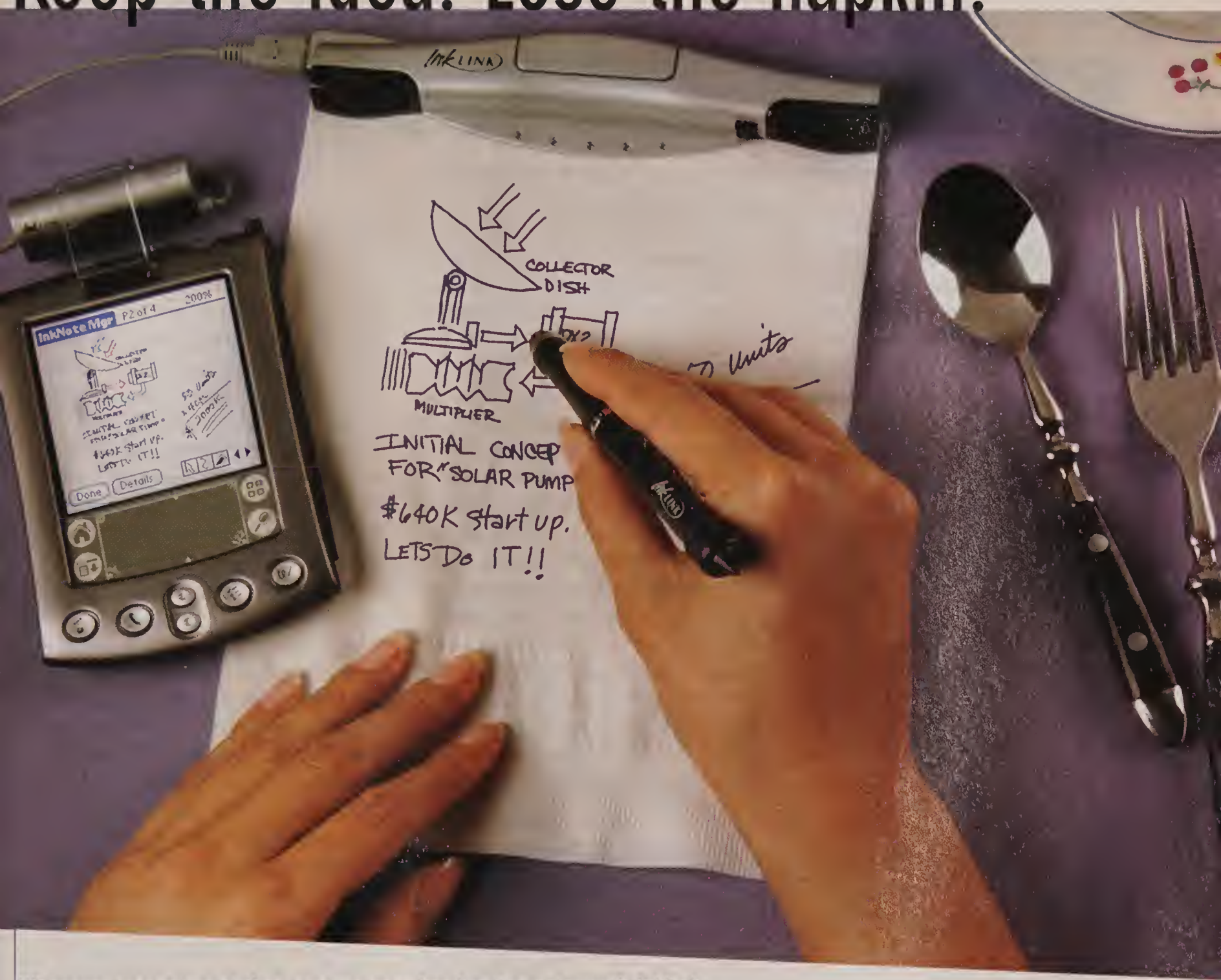
WHICH BROADBAND OPTION IS RIGHT FOR YOU?

START HERE:



PHOTOGRAPH: MARC SIMON; ILLUSTRATION: CELIA JOHNSON

Keep the idea. Lose the napkin.



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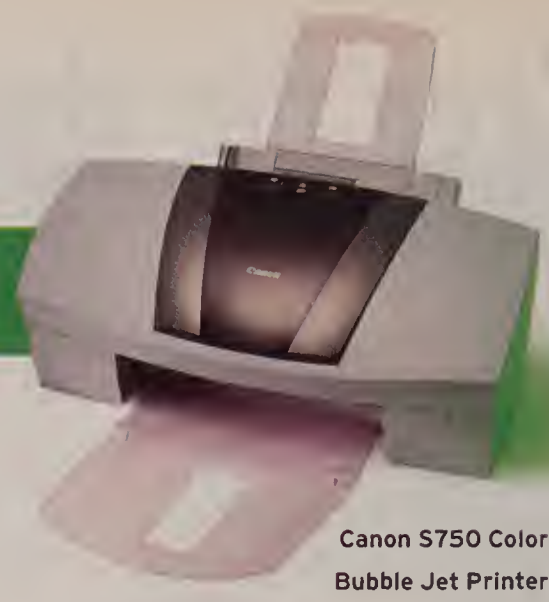


Canon S750 Color Bubble Jet Printer

WHAT MATTERS: Ink jets print great photos, and lasers excel at text. But you can't get both in one printer, so you'll have to compromise.

FOR MOST PEOPLE, choosing a printer entails balancing price, speed, and print quality. But as models improve, manufacturers differentiate them in other ways. Ink jet printers, along with digital cameras, are changing the way we print photographs. When loaded with special photo inks and paper, ink jet printers become one the best options for transforming a digital image into a photograph.

For monochrome lasers—whose text quality is so good and uniform that models' output samples are almost indistinguishable from each other—breadth of features is a major selling point. This is good news for busy offices; for example, thanks to extra paper trays and more memory, lasers can print more efficiently, and they come with more-capable drivers that permit easier remote management. As color lasers continue to drop in price, more users can afford to add color to their workplace documents. The least-expensive color lasers cost around $1000.

Key Features

➤ **SPEED:** The marketing war among printer vendors has escalated so far that it has yielded utterly meaningless rated print speeds. Vendors frequently cite ratings based on printing the simplest text documents, or printing in draft mode; some don't count the time it takes for the PC to send a job to the printer. In any case, claimed speeds can be two, three, or more times the speeds you'll see in real-world printing. For the models ranked for our "Top Ink Jet Printers" chart, the rated text speeds ranged from 5.2 to 21 pages per minute. But in our tests, actual text speeds ranged from just 1.9 to 7.2 ppm—we clocked a printer rated at 21 ppm at just 6.6 ppm, for example. Similarly, vendors claimed graphics speeds ranging from 2.2 to 15 ppm, while our tested speeds ranged from 0.5 to 1.5 ppm.

Although you will get the same empty promises from monochrome and color laser vendors, lasers do outrace ink jets. In our tests, monochrome lasers printed text at 10 to 18 ppm, while color lasers were about a third slower, at 7 to 12 ppm. Color lasers' graphics printing speeds ranged from 1 to 3 ppm—up to eight times slower than advertised.

➤ **PRINT QUALITY:** Almost all monochrome and color lasers print razor-sharp text. Color lasers print color charts and other two-dimensional graphics well, but don't match ink jets in handling photographs. While ink jet photos can be beautiful, especially on glossy paper, most ink jet printers produce somewhat fuzzy, jagged text and can't reproduce fine detail in line art or graphics well.

➤ **RESOLUTION:** Most ink jet printers have a maximum color resolution of 2400 by 1200 dots per inch (dpi); newer models boast resolutions of up to 4800 by 1200 dpi. But a higher resolution doesn't always translate into a better-looking image; such factors as dot size also play a part. Many printers use software to interpolate an image—smoothing areas of color, filling in gaps, and sharpening more-detailed sections. These enhancements can affect print quality as much as resolution. The best way to determine print quality is not to look at the resolution, but to print out a sample and judge for yourself.

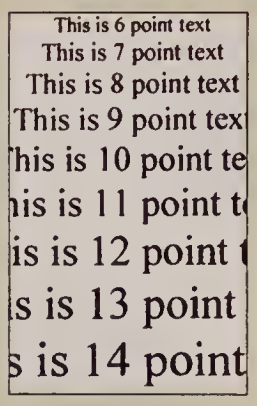
Monochrome lasers usually have a maximum resolution of either 600 by 600 dpi or 1200 by 1200 dpi, and color lasers usually offer a maximum color resolution of

CLOSE-UP

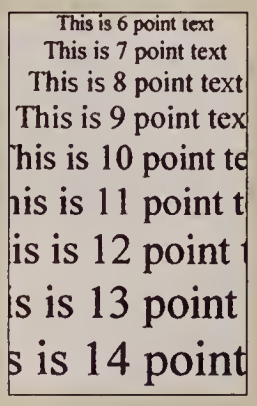
LASER VS. INK JET VS. PHOTO PRINTER

PERSONAL MONOCHROME LASERS are beginning to rival ink jets in price, and they produce consistently better text. Photo printers are supposed to print photos better than general-purpose ink jets, but you may not be able to tell the difference.

Samsung 1210



Lexmark Z65



TEXT FROM a $299 monochrome laser (left) is significantly sharper and less jagged than text from a $199 ink jet.

Canon S820 **Canon S520**

ON GLOSSY PAPER, photos from a $249 photo-quality ink jet printer (left) and a $129 ink jet both look vivid and detailed.

PHOTOGRAPH: MARC SIMON; ILLUSTRATION: CELIA JOHNSON

either 1200 by 1200 dpi or 2400 by 1200 dpi. Even the lower resolutions suffice for printing sharp text and simple graphics.

➤ **COST PER PAGE:** For ink jets, ink expenses play the biggest part in the overall cost of the printer over time. Vendors typically charge $21 to $38 for a three-color cartridge and $12 to $34 for a separate black cartridge. Usually, the cheaper a cartridge is, the less ink it holds; yields range from about 300 to 800 pages per cartridge. So a page of black text can cost from 1 to 7 cents, and a page of color, 6 to 18 cents.

Many vendors offer higher-capacity cartridges; though more expensive, they contain more ink, so they cost less per page. Several models come with individual cartridges for each color instead of one cartridge for all three colors. You'll save some ink by replacing cartridges one at a time, but they cost a few dollars more, so per page, individual cartridges cost about the same. If you expect to use one color more than the others—many of your documents have a red logo, say—consider a printer that uses individual cartridges.

Monochrome and color laser cartridges cost about 2 to 4 cents per page of black text, but color lasers have separate toner cartridges for each color, which can cost as much as $250 each (less for black). Even with the high overall cost, the cost per page of a color laser's cartridges is still less than for color from an ink jet, because the yields are so much higher—ranging from 6000 to 12,000 pages.

➤ **FEATURES:** Almost all ink jets offer the same set of features: one paper tray that holds either 100 or 150 sheets and 10 envelopes; minimal buffer memory; and no networking option. But a few more-expensive business-oriented ink jets have higher paper capacities, optional paper trays, ethernet or 802.11b wireless networking, and more memory.

Lasers generally have more features and options than ink jets. Monochrome lasers hold from 150 to 700 sheets, and corporate models frequently hold 600 sheets standard; color lasers hold from 200 to 1200 sheets. You can add trays that hold up to 5000 sheets. Most corporate lasers include at least 8MB of RAM, and expansion options let you add many times that amount for queuing multiple print jobs at once (for a busy office, equip your laser with at least 32MB); some models offer optional hard drives where you can save complex forms and other preprocessed images or store passwords for confidential print jobs, and they all have standard or optional ethernet adapters.

➤ **PHOTO PRINTING:** Various photo-quality ink jets include extra features such as a dedicated USB port for connecting your digital camera directly to the printer, built-in media card slots that let you plug in a storage card and hit a button for instant prints, or an LCD menu for selecting prints. Each of these options means you don't have to go through a PC. These printers can produce beautiful color photos. But don't rule out general-purpose ink jets, which can serve very well as photo printers, too. If you change the settings in the driver to "Best" or "Photo" mode and use premium photo paper, many inexpensive, sub-$100 printers can create high-quality photo prints.

Recommendations

INK JETS HAVE LOW sticker prices and produce great-looking images, especially photos. The $169 Canon S750 Color Bubble Jet Printer is a moderately priced ink jet we like. You lose a lot to get color, however: Ink jets are slower than lasers, printed text looks worse, and they cost more in the long run. So, if you expect to print text most of the time, buy a midrange monochrome laser—they can cost less than a high-end ink jet—and go to a local copy shop for the color prints you occasionally need. The $299 Samsung ML-1450 is a fine, inexpensive monochrome laser.

Prices for color lasers rival those for high-end monochrome lasers, so an office can get a workhorse black-and-white printer that also generates color prints—though it won't print photos well. Note that you'll sacrifice speed, and cartridges are expensive, but offices with occasional color printing needs won't have to buy them often. Lexmark's $2069 C720N is a good, medium-priced color laser.

—Lisa Cekan ▶

FEATURES COMPARISON

TOP INK JET PRINTERS

TEST Center

	INK JET PRINTER	Specs [1]	Comments
1	Best BUY Canon S750 Color Bubble Jet Printer ★★★★☆ May 02 find.pcworld.com/22841	• $169 • 7.2 ppm B&W, 1.2 ppm color • 2400 by 1200 dpi • 100 sheets input, 50 output	The quick S750 printed beautiful glossy photos and handled text with good accuracy and speed for an ink jet. Its gray-scale images and lines were only adequate. Price drops $30 this month.
2	Best BUY Epson Stylus C80 ★★★★☆ Jan 02 find.pcworld.com/16660	• $149 • 6.9 ppm B&W, 1.5 ppm color • 2880 by 720 dpi • 150 sheets input, 30 output	This fast unit works well for high-volume home-office printing. Text quality is adequate, but it excels at printing photos and uses pigment-based inks, so photos should last longer.
3	Canon S520 Color Bubble Jet Printer ★★★½☆ July 02 find.pcworld.com/27442	• $129 • 6.6 ppm B&W, 1.0 ppm color • 2400 by 1200-dpi • 100 sheets input, 50 output	Text printed fast but looked somewhat fuzzy. Graphics and photos were smooth and detailed; colors appeared slightly oversaturated, though. The printer's price drops $20 this month.
4	HP Deskjet 940c Color Inkjet Printer ★★★★☆ Jan 02 find.pcworld.com/16681	• $149 • 4.7 ppm B&W, 0.7 ppm color • 2400 by 1200-dpi • 150 sheets input, 50 output	Text and graphics speeds were fairly slow, but gray-scale images looked beautifully smooth and sharp in our tests. Glossy photos displayed great detail and texture but were too dark.
5	HP Deskjet 920c Color Inkjet Printer ★★★☆☆ Mar 02 find.pcworld.com/19264	• $99 • 4.2 ppm B&W, 0.7 ppm color • 2400 by 1200-dpi • 100 sheets input, 50 output	This inexpensive—albeit somewhat slow—printer turned in respectable image quality, with detailed, attractive graphics. The 90-day warranty is shorter than those of other vendors.

Visit find.pcworld.com/30077 for more rankings and for product reviews.

[1] Street prices are reported as of 6/14/02. Printing speeds listed are as measured by the PC World Test Center.

Monitors

WHAT MATTERS: Inexpensive CRT and LCD models are suitable for general use, but many full-featured models are worth the extra cost.

IF YOU REPLACED an old PC in the last few years, you probably decided to use the old monitor with the new machine. That's okay if it's in good shape—most monitors have a life span of about five years—but if it's a worn-out 15-inch CRT that produces barely legible text at 800 by 600 pixels, you're hobbling your productivity.

Most monitor manufacturers produce entry-level lines that combine very low prices with pared-down features. These monitors work well enough for Web surfing, e-mail, and other office productivity tasks—as long as they provide adequate resolutions and refresh rates. Midrange and professional lines tend to offer better image quality and extensive features, such as superior image-adjusting controls and USB 1.1 ports. Some professional-level monitors even include asset control, to help IS managers keep track of their companies' property via a LAN.

In general, graphic artists prefer CRT monitors because they show truer colors and greater nuance, whereas people who work mostly with text gravitate toward LCDs because pixels on an LCD have well-defined edges, resulting in sharply focused letters. Because CRTs redraw their screens more quickly than LCDs—so moving images never leave visible trails—gamers prefer them, too.

CLOSE-UP

LCD MONITOR VS. CRT MONITOR

Eizo Nanao FlexScan L365 (left) and Samsung SyncMaster 700NF.

15-INCH LCD	17-INCH CRT
• Offers 15 inches of viewable area	• Offers 15 inches of viewable area
• 9 to 10 pounds, and 8 inches deep	• 35 to 40 pounds, and 16 inches deep
• Flicker-free	• Visible flickering at low refresh rates
• Draws 35 watts of power	• Draws 100 watts of power
• Poor visibility at wide angles	• Clearly viewable at nearly any angle
• Optimal for text use	• Best for graphics

Samsung SyncMaster 152T

Key Features
CRT Monitors

➤ **TUBE TYPE:** Shadow-mask displays employ a metal sheet perforated with small holes to focus an electron beam that illuminates phosphors on the inside of the tube. These monitors usually have a slightly curved face, though some flat-screen models are available. Shadow-mask monitors are generally the monitor of choice for use with drawing applications such as CAD because they tend to render accurate straight lines.

Other CRT monitors have aperture-grille tubes, which send their electron beams through an array of thin vertical wires. The grille is supported by one or two wires that cause a faint line to appear in the bottom and top thirds of a white screen. Many aperture-grille models, which tend to cost more than shadow-mask displays, have a flat face. They typically render bright images, making them ideal for people who work with graphics. Though they cost more, flat-faced models repay the investment, because they present a clear, undistorted image and reduced glare from ambient light.

➤ **DOT PITCH:** Despite their prominence in advertisements, dot pitch and stripe pitch aren't the best indicators of a monitor's image quality. Dot pitch (or diagonal dot pitch) is the distance between two like-colored phosphors on a shadow-mask CRT. For aperture-grille tubes, vendors cite stripe pitch—the horizontal distance between two like-colored stripes of phosphor. For shadow-mask displays, ads may also list horizontal dot pitch; this is the distance between two columns of dots

PHOTOGRAPHS: MARC SIMON; ILLUSTRATION: CELIA JOHNSON

of the same color—a lower number than for diagonal dot pitch, but one meant to be more comparable to the stripe pitch figure. Correlating these measurements with actual performance is difficult, but your eyes provide the best gauge of image quality: Observe how the kinds of documents and pictures you work with look.

➤ **RESOLUTION AND REFRESH RATE:** A 17-inch CRT monitor with a listed maximum resolution of 1600 by 1200 may seem high-end, but if it can display that resolution only at a refresh rate of 60 Hz, you shouldn't be impressed. A monitor's refresh rate indicates the number of times per second the screen gets redrawn. At any refresh rate lower than 70 Hz, your eye will likely detect the screen flickering.

Even if the monitor supports a high refresh rate, text and icons must be large enough for comfortable viewing. Text on a 17-inch monitor at 1600 by 1200 resolution will be small for all but the sharpest eyes, though most people could work at that resolution on a 21-inch model.

LCD Monitors

➤ **NATIVE RESOLUTION:** Because an LCD uses a matrix of cells to display its image, it has a fixed (or native) resolution at which it looks best. A 15-inch LCD has a native resolution of 1024 by 768, while a 17- or 18-inch model will look its best at 1280 by 1024. If you set the monitor to a lower resolution, the image will blur, because the display will use only a portion of the pixels it contains and will scale up the resulting image to fill the screen.

Though scaling technologies have improved recently, you're likely to be disappointed with the results. Text looks jagged at nonnative resolutions, so an LCD is a good choice if you tend to use just one resolution for all applications.

➤ **VIEWING ANGLE:** An LCD's viewing angle (measured in degrees) indicates how far you can move to the sides or above or below the center of the display before the image begins to darken or blur. An angle of 160 degrees is advisable; a narrower angle may make the screen look as if you were seeing it through a tunnel. Vendors measure viewing angles in different ways, so those specs are similarly meaningless, except within brands. Whatever the spec reads, viewing angle is vital, so view before you buy.

Many LCDs have stands that can adjust or swivel sideways; this can help compensate for a relatively narrow viewing angle.

➤ **CONTRAST RATIO:** This term refers to the difference in light intensity between the brightest white and the darkest black that an LCD can produce. Look for a contrast ratio of 300:1 or better—with anything lower, colors may wash out when you turn up the brightness and may disappear when you turn it down.

➤ **DIGITAL VS. ANALOG:** If your PC has a graphics card with digital video-out, choose a digital LCD. Because the image won't have to be converted from analog to digital and back again, it will be clearer. Even if your system doesn't have a DVI port, a digital LCD makes sense, since most also have an analog connection. Digital inputs tend to be found on relatively high-end models, but they are becoming increasingly prevalent at all price levels.

Both CRTs and LCDs

➤ **SIZE AND DEPTH:** Bear in mind the size of your workspace when deciding on the type of monitor to buy. The average 17-inch CRT monitor can measure almost 17 inches deep and weigh 40 pounds or more, while an average 17-inch LCD takes up half the space, with a depth of 8 inches and a weight of 17 pounds.

Recommendations

IF YOU PLAN to do little more than surf the Web and write e-mail, a basic CRT or LCD should suffice. A $300-to-$400 19-inch CRT is your best choice for graphics or image editing. For instance, ViewSonic's GS790, which earned a Best Buy on our most recent *Top 10 19-Inch Monitors* chart, delivers rich, lifelike colors.

If you spend most of your time editing text or using spreadsheets, a 15-inch LCD monitor like NEC's MultiSync LCD1550X makes a good choice. Prices start at under $400 for 15-inch LCDs, but many 17-inch models now cost less than $800.

—*Kalpana Narayanamurthi* ▶

FEATURES COMPARISON

TOP LCD MONITORS

TEST Center

	15-INCH LCD MONITOR	Specs[1]	Comments
1	Best BUY NEC MultiSync LCD1550X ★★★★½ June 02 find.pcworld.com/24881	• $549 • 13.6 by 7.9 by 14.9 inches, 13.2 pounds • Analog and digital video inputs • Pivots using PivotPro software	This monitor has an average price but provides excellent image quality. Dual inputs allow you to hook it up to an older PC or one with DVI-out.
2	Best BUY Samsung SyncMaster 152T ★★★★½ NEW find.pcworld.com/29942	• $549 • 14.1 by 7.2 by 14.1 inches, 6.6 pounds • Analog and digital video inputs • Optional USB 1.1 hub	This lightweight, easy-to-carry panel with a silver finish renders exceptionally crisp, smooth letters. Colors also look bright and vibrant.
3	NEC MultiSync LCD 1550M ★★★★☆ NEW find.pcworld.com/29943	• $499 • 13.6 by 6.4 by 14.3 inches, 9.9 pounds • Analog video input • Four-port USB 1.1 hub	The LCD 1550M feels sturdy, but its beige bezel looks dowdy next to more-stylish LCD monitors. Image quality is respectable, with vivid colors.
4	Iiyama Pro Lite 3835UT ★★★★☆ June 02 find.pcworld.com/24801	• $549 • 13.5 by 8.4 by 13.5 inches, 13.2 pounds • Analog and digital video inputs • Pivots using PivotPro software	This gray-toned display performs extremely well on text and respectably on graphics, but trails the like-priced Samsung and NEC models overall.
5	Sharp LL-T15V1 ★★★½☆ June 02 find.pcworld.com/24921	• $399 • 13.3 by 7.4 by 12.7 inches, 7.5 pounds • Analog video input • Includes Sharp setup utility software	This no-frills unit doesn't have a digital input, but it does offer reasonably good image quality, a stylish design, and an attractive price.

Visit find.pcworld.com/30092 for more rankings and product reviews.

[1] Street prices are reported as of 6/17/02. Monitor dimensions are listed in order by width, depth, and height.

Scanners

Visioneer OneTouch 9000 USB

WHAT MATTERS: A scanner with at least 1200 dpi and 48-bit color depth gives demanding users the most image-editing flexibility.

TODAY'S CONSUMER SCANNERS commonly have optical resolutions of 2400 dots per inch—and that's likely to remain the maximum for a while because manufacturers are opting to improve ease of use rather than upgrade the core hardware. For example, HP will add a photo feeder to an upcoming model, and Epson is incorporating its Print Image Matching feature into future units to simplify color calibration with Epson printers. Support for Windows XP is now practically universal among new scanner models.

Key Features

➤ **OPTICAL RESOLUTION:** For displaying photos on the Web or printing snapshots, 100 dots per inch is plenty of resolution; for capturing text using optical character recognition, 300 dpi is standard; any scanner on the market can easily perform those tasks. But if you want to make 8-by-10-inch or larger prints, or enlarge smaller images, opt for a scanner with 1200 dpi or 2400 dpi of optical resolution. You'll have more image-editing flexibility if you start with the highest possible resolution. Be warned, however, that high-resolution images take a lot of hard disk space—even a modest 1200-dpi, 2-by-2-inch photo can consume 17MB. Also, scanning at high resolutions tends to take longer.

➤ **TRANSPARENCY ADAPTER:** Scanning slides or film requires a transparency adapter—a light source that shines through the film, which is normally held in place with a template. Transparency adapters can be built into a scanner's lid, or they can be separate modules. The separate adapters let scanner makers keep the lid thin or put an automatic document feeder into the lid. Transparency templates come in different sizes: Many are sized for three slides or a 6-inch-long filmstrip, and some are big enough for one or more large-format transparencies.

➤ **AUTOMATIC DOCUMENT FEEDER:** An automatic document feeder is helpful if you need to handle high-volume optical character recognition or scan extra-long pages. HP and Microtek sell aftermarket ADFs (for around $200) for some models, but buying a scanner and ADF separately is more expensive than purchasing a scanner that includes an ADF at the outset.

➤ **INTERFACE:** Scanner makers are currently releasing products that come with USB 2.0 interfaces (which are backward-compatible with USB 1.1 connections). We have not seen great speed jumps from USB 2.0 scanners so far.

➤ **COLOR DEPTH:** The amount of color (or gray-scale) data a scanner can recognize and save, called *bit depth*, is measured in bits per pixel. Since a scanner usually can capture more data than its driver can save, you'll frequently see bit depth qualified with a term such as *internal* or *hardware*, referring to how much data the scanner can recognize. *External* or *true* bit depth describes how much data the scanner's driver can save. For almost all forms of general-purpose use, 24-bit external color depth is sufficient.

Recommendations

FOR GENERAL HOME and office use, opt for a scanner like the $150 Microtek ScanMaker 4900, which has attractive output, good speed, a robust driver, and useful software. For heavy document processing, consider a scanner with a 25-sheet ADF, such as HP's $399 Scanjet 5490c.

—Rebecca Freed ▶

FEATURES COMPARISON

TOP FLATBED SCANNERS — TEST Center

	SMALL-OFFICE SCANNER	Specs [1]	Comments
1	Best BUY Microtek ScanMaker 4900 ★★★★☆ Aug 02 find.pcworld.com/29124	• $150 • 2400-by-4800-dpi optical resolution • USB 1.1 interface • 48-bit external color depth	Solidly constructed model is easy to install; useful software, a robust driver, removable lid, and transparency adapter increase its value.
2	Visioneer OneTouch 9000 USB NEW ★★★½☆ find.pcworld.com/29882	• $129 • 1200-by-4800-dpi optical resolution • USB 2.0 interface • 48-bit external color depth	Visioneer's latest places first among small-office units for overall speed, and its software bundle is a good value. The image quality could be better, though.
3	Canon CanoScan Lide 30 ★★★½☆ NEW find.pcworld.com/29883	• $99 • 1200-by-2400-dpi optical resolution • USB 1.1 interface • 24-bit external color depth	Like other CanoScans, the Lide 30 has a slim profile and produced vivid, accurate color scans. But this unit ranks among the slowest we've tested.
4	Epson Perfection 1650 Photo ★★★½☆ Aug 02 find.pcworld.com/15842	• $199 • 1600-by-3200-dpi optical resolution • USB 1.1 interface • 48-bit external color depth	Sturdy, versatile model produced zippy black-and-white scans and crisp, colorful images. Its price drops $50 this month.
5	HP Scanjet 5400c ★★★½☆ Aug 02 find.pcworld.com/29122	• $199 • 2400-by-2400-dpi optical interface • USB 1.1, parallel interfaces • 48-bit external color depth	The 5400c scored better on monochrome line art than on color scans; video clips make installation foolproof. HP's driver includes an OCR engine.

Visit find.pcworld.com/29954 for more rankings and product reviews.

[1] Street prices are reported as of 6/14/02. The maximum bit depth a scanner's driver can save is commonly called its *external* bit depth. The maximum bit depth a scanner's hardware can capture is commonly called its *internal* bit depth. Of the two, external bit depth is the more important number for prospective buyers to focus on.

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ThinkPad Port Replicator	(#02K8667)	$179
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Beyond the Box

Take tech on the road in the form of a digital camera, a digital video camcorder, a PDA, a mobile phone, or an MP3 player. With these devices, portability is as important as function—sometimes more important.

Digital Cameras

Fujifilm FinePix F601 Zoom

WHAT MATTERS: High resolution will help you *print* great photos, but to get great photos in the first place, look beyond the pixels.

WITH DIGITAL CAMERAS, resolution remains the prime specification that vendors hype, and it's the most important buying criterion for customers. Relatively inexpensive 4-megapixel models are common, but only a couple of models reach 5 megapixels. Though experts predict the ascent will plateau at 6 megapixels, we doubt people will ever get enough.

However essential resolution is, other factors also matter: Cameras need more than just a high pixel count to make attractive pictures. For example, a lethargic camera that takes too much time between shots may miss the best action, and a big, heavy camera may spend more time on the shelf than in your carry-on bag.

Key Features

➤ **RESOLUTION:** If you intend to take pictures only to e-mail to distant friends or to print at snapshot size, a camera of most any resolution will do. Even so, more pixels give you greater flexibility—you can print sharper pictures at larger sizes, or crop small pieces out of pictures. Our rules of thumb: A 2-megapixel camera can usually produce a pretty 5-by-7 print; a 3-megapixel camera, an 8-by-10; and a 4-megapixel model, an 11-by-17.

➤ **SIZE, WEIGHT, AND DESIGN:** To some users, how much a camera weighs and whether it fits in a pocket may be more important factors than resolution. *PC World* has tested cameras that weigh as much as 2.6 pounds and as little as 6.8 ounces. The heaviest, Olympus's sophisticated Camedia E-20N, has many features you'll never see on smaller cameras, but it's bigger than most single-lens reflex film cameras. The lightest, Kyocera's Finecam S3, is smaller than many PDAs. On the other hand, small cameras frequently have tiny dials and buttons that make changing settings somewhat trying.

➤ **ZOOM LENS:** Inexpensive cameras often lack optical zoom lenses. If we had to choose between an optical zoom and a one-step-higher resolution, we'd take the zoom—you won't have to magnify and crop the image in software (and discard some of that resolution as a result).

Some cameras have a difficult time focusing in close-up or in dim settings. A few cameras offer external lamps or infrared emitters to aid in focusing; such attributes are highly valuable if you photograph subjects in dark settings.

➤ **MANUAL FOCUS:** For close-ups or situations in which the camera can't get a focus lock, switching to manual focusing can help you get the picture. Low-end cameras often omit manual focusing or

FEATURES COMPARISON

TOP DIGITAL CAMERAS — TEST Center

	SYSTEM	Specs	Comments
1	Best BUY Canon PowerShot G2 ★★★★☆ Dec 01 find.pcworld.com/14800	• $799 • 4 megapixels • 32MB CompactFlash • 3X optical zoom	Full-featured camera takes the best photos we've seen and has a long battery life. Heavy, boxy body incorporates a swing-out viewfinder like that of a camcorder; includes a wireless remote control.
2	Best BUY Nikon Coolpix 995 ★★★★☆ Dec 01 find.pcworld.com/14801	• $599 • 3.2 megapixels • 16MB CompactFlash • 4X optical zoom	Offers a huge, sometimes intimidating list of features, including a swivel lens and custom buttons. Photos look good, showing fine detail. Soon to be replaced by the 4-megapixel Coolpix 4500.
3	Sony Cyber-shot DSC-F707 ★★★★☆ May 02 find.pcworld.com/23902	• $999 • 5 megapixels • 16MB Memory Stick • 5X optical zoom	Besides futuristic styling, this camera has an impressive 5X optical zoom. Unique low-light features let it shoot in dark rooms with or without flash. The electronic viewfinder is not as sharp or as fast as we'd like.
4	Nikon Coolpix 5000 ★★★★☆ May 02 find.pcworld.com/23881	• $1099 • 5 megapixels • 32MB CompactFlash • 3X optical zoom	At only 15 ounces, the Coolpix 5000 is light for a 5-megapixel camera. It offers a huge selection of controls but isn't the quickest or easiest camera to handle.
5	Sony Cyber-shot DSC-S85 ★★★★☆ Dec 01 find.pcworld.com/14803	• $699 • 4 megapixels • 16MB Memory Stick • 3X optical zoom	The DSC-S85 is well designed and easy to use, with extremely long battery life. Photos looked a bit oversaturated, however, and the shutter button is touchy. Sony's trademark Jog Dial simplifies menu navigation.

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PHOTOGRAPHS: MARC SIMON; ILLUSTRATION: CELIA JOHNSON

allow only stepped focusing—you must choose from a few preset distances.

➤ **STORAGE:** At its highest resolution, a typical 2-megapixel model can store eight to ten images on an 8MB "starter" memory card. CompactFlash and SmartMedia cards cost about $35 for 64MB, or $65 for 128MB. Secure Digital cards cost more: about $45 for 64MB, or $75 for 128MB. Some Sony cameras store images on floppy disks or compact discs. But floppy storage is slow, and the disks hold only one or two high-resolution images. CDs store more images, but the cameras that use them are both slow and bulky.

➤ **BATTERIES:** Cameras use one or more of several battery types: AAs, either nonrechargeable alkaline ($6 for four) or rechargeable nickel metal hydride (about $14 for four); high-capacity disposable CRV3s (around $12); or proprietary rechargeable batteries that can cost $35 to $75 to replace. Some chargers are larger than the cameras their batteries plug into, but Canon's Digital Elph series features a charger whose prongs fold out of its body (so it has no cord for you to deal with). For cameras that take AAs but don't come with rechargeable batteries, consider buying rechargeable nickel metal hydrides ($35 for a set of four and a charger).

➤ **MOVIES AND SOUND:** Many cameras can capture video as well as still shots, though memory cards don't hold much video footage; the option is useful only for short clips. But some models don't capture sound—can you live without talkies?

➤ **EXPOSURE SETTINGS:** All digital cameras let you shoot in fully automatic mode—just press the shutter release and you get a picture. Better cameras offer aperture- and shutter-priority modes, in which you adjust, respectively, either the size of the lens opening or how long the shutter stays open; the camera automatically controls the other variable to give you the proper exposure. Usually the same cameras also offer full-manual exposure control, in which you set both variables. These modes make a camera adaptable to almost any situation.

Program modes let you select from presets that manage the exposure automatically—for example, choosing "Sports" will open the aperture to a wide setting and force a fast shutter speed. They're useful, but you may have to spend extra time deciding which mode fits your setting.

➤ **WHITE BALANCE:** Almost all digital cameras let you choose a white-balance setting via presets. These settings tell the camera the color temperature of the light in a setting so that white comes out white and black comes out black—and, by inference, red comes out red. If you're finicky about color accuracy, look for a manual calibrator in which you press a button while aiming at a white object.

➤ **USABILITY:** Good cameras can take pictures, display them, and let you scroll through menus quickly without having to stab buttons again and again to get something to work. Compare models side-by-side to gauge their speed.

➤ **LCD:** Low-end models often omit an LCD screen—a feature necessary for macro (close-up) shooting, and for reviewing just-taken images. LCD quality varies widely: Many wash out in sunlight or become grainy in low light, or the image changes if you tilt the camera slightly.

➤ **SOFTWARE:** Few cameras come with truly valuable image editing software, such as Adobe Photoshop Elements or Ulead PhotoImpact. Canon includes panoramic stitching software.

CLOSE-UP

ZOOMING IN ON DIGITAL CAMERAS

A good camera's lens doesn't keep moving after you remove your finger from the zoom.

Look for the letters M, A, and P on the camera's control dial. They indicate manual exposure modes.

Well-designed cameras let you change some settings via buttons; others bury everything in deep menus.

An external lamp helps the camera focus in low (or no) light. Other cameras use infrared emitters instead.

The best cameras' lenses move quickly and quietly, and have little trouble focusing.

Canon PowerShot G2

Recommendations

LOOK FOR A MODEL that has a zoom lens, operates quickly, and offers flexible exposure settings, such as the Olympus Camedia C-3020 (find.pcworld.com/25702). If you expect to make large prints, opt for a 4-megapixel model, such as the Canon PowerShot G2. If size and portability matter, try out the diminutive models from Canon, Konica, and Kyocera.

—Alan Stafford ▶

Canon Elura 40MC

DV Camcorders

WHAT MATTERS: A big LCD screen and plenty of features justify a higher price, but overall size and ease of use are critical.

EVER SINCE HOME movie cameras were invented, people have been pointing them at one another and asking family and friends to do something amusing. And right from the start, people have been bored silly watching movies of others not doing anything amusing. Fortunately, the latest digital video camcorders and video editing software make shooting and editing a movie as simple as using a word processor, so it's easy to cut out the boring stuff and just show the priceless part where Uncle Bob trips over the cat and falls into the swimming pool. For more details on video editing apps, see our March 2002 review at find.pcworld.com/29987. For our look at DVD authoring programs, see find.pcworld.com/30059.

Digital camcorders still use videotape (most use a format called MiniDV), but some can also store video on memory cards. Camcorders that store video exclusively on memory cards are now available, as well: Panasonic recently launched the SV-AV10, which can record up to 30 minutes of video to a Secure Digital memory card. However, this camera records video at a much lower resolution than a MiniDV camcorder does and highly compresses it, so memory cards won't start supplanting videotapes as the most convenient way to record video anytime soon.

Key Features

➤ **SCREEN:** Having a large LCD screen on a camcorder lets you more easily see what you're recording and facilitates playback previews. When shopping, try the screen in daylight if possible; some wash out in bright sunlight, one environment in which you'll often be using the camcorder. A viewfinder, meanwhile, is easier to see in daylight and uses less power, extending the camcorder's battery life.

➤ **LENS:** Most modern camcorders have at least a 10X optical zoom, which should be adequate for general purposes. Vendors typically advertise the maximum digital zoom, but to achieve that length of zoom the camcorder enlarges part of the image to fill the screen, leading to grainy, pixelated, and generally unpleasant-looking images. At higher digital zoom settings, the quality is so poor you can't see what you are taping. Fortunately, most camcorders allow you to turn the digital zoom off or restrict how far it can zoom in. The spec for maximum optical zoom is the more interesting figure: It denotes the maximum zoom that the lens itself can achieve without enhancement.

➤ **BATTERIES:** Most camcorders won't last more than an hour with the included batteries. So factor in the cost of a higher-capacity battery that can keep the camcorder going, if you think you'll need it. A higher-capacity battery that can double the battery life typically costs $50 to $100.

➤ **MICROPHONES:** We've found that camcorders with microphones mounted in the front tend to produce better sound than those with microphones on the top; in particular, top-mounted microphones frequently pick up the voice of the person using the camera, drowning out everything else. Many of the more-expensive camcorders offer zoom microphones that can emphasize the subject's voice and minimize other sounds, and some also come with a socket to plug in an external microphone. Either type of microphone can be very useful when you're recording presentations or speeches and want to record the speaker but not the audience.

➤ **CCD SIZE:** As a general rule, the more pixels the camcorder CCD (the chip that captures the video) has, the better the image quality of the resulting video will be. Most camcorders also offer some

FEATURES COMPARISON

DIGITAL CAMCORDER PICKS

	SYSTEM	Specs	Comments
1	Panasonic PV-DV702 ★★★★½ NEW find.pcworld.com/29834	• $740 • 3.5-inch LCD screen • 10X optical/700X digital zoom • 20.8 ounces	Offers an excellent screen, easy-to-use controls, and two very effective low-light modes. The viewfinder is black-and-white.
2	Sony DCR-IP5 ★★★★☆ NEW find.pcworld.com/29991	• $950 • 2.5-inch LCD screen • 10X optical/120X digital zoom • 12 ounces	The smallest camcorder we've seen, at 1.9 by 4 by 3.1 inches. The controls are rather awkward to use, however, and only Sony's software can edit the MicroMV tape format.
3	Canon Elura 40MC ★★★½ NEW find.pcworld.com/29992	• $900 • 2-inch LCD screen • 10X optical/300X digital zoom • 13.4 ounces	A small and sleek camcorder with plenty of features. Fits well in the hand, but the controls are a little confusing and the LCD screen is less spacious than those of similarly sized camcorders.
4	JVC GR-DVL120U ★★★☆☆ NEW find.pcworld.com/29993	• $500 • 2.5-inch LCD screen • 16X optical/700X digital zoom • 22.4 ounces	This budget model has the highest optical zoom ratio we've seen; it has no memory card slot, however, and the LCD screen is smaller than those on cameras of comparable size.
5	Sharp VL-NZ100U ★★★½ NEW find.pcworld.com/29994	• $599 • 3-inch LCD screen • 10X optical/300x digital zoom • 16 ounces	Has an interesting design with the LCD screen on the back of the case and a lens that you can rotate, but you need both hands to use it. The controls don't feel natural in your hand.

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PHOTOGRAPHS: MARC SIMON, ILLUSTRATION: CELIA JOHNSON

form of image stabilization, in which the camera will try to compensate for vibrations that could result in blurred video.

➤ **ABILITY TO TAKE STILL IMAGES:** Many digital camcorders can act as digital cameras, saving still images to a memory card. Some can save images at the same resolution as a 2-megapixel camera. However, none of the camcorders we've tested have worked as well as dedicated still cameras do; they don't provide the same level of control or the same image quality. Many vendors offer similar models with and without this feature; if you aren't likely to use it, you can save $100 or more by choosing the model that lacks it.

➤ **CONTROLS:** One important buying consideration is how well the camcorder balances size and usability. We have found that the controls on some smaller camcorders (such as the Sony DCR-IP5 and the Canon Elura 40MC) can be difficult to use because the controls don't naturally sit where your fingers fall; you sometimes have to shift the camera to reach them, or use both hands. In particular, on many smaller camcorders the zoom control (a control that most people use a lot) can be awkwardly placed.

➤ **LOW-LIGHT RECORDING:** Many camcorders can record in very low light, either with the help of an included infrared light (which you can't see, but the camcorder can) or through a special long shutter mode that makes the most of the existing light; some more expensive models offer both. These can be useful in poorly illuminated settings, such as when you're capturing a camping trip or the creatures entering your yard after nightfall. Low-light footage may be grainy, however, and camcorders that use an infrared light capture only black-and-white video.

➤ **FORMAT:** Most camcorders use the MiniDV videotape format, but Sony also offers Digital 8 and MicroMV formats. A Digital 8 camcorder records digital video onto Hi-8 videotapes and can also play back analog videotapes recorded on Hi-8 camcorders. MicroMV camcorders (such as the Sony DCR-IP5) use a new type of tape that is smaller than MiniDV tapes. A MicroMV camcorder, however, compresses the digital video much more than a MiniDV camcorder, so most digital video editing programs are unable to edit the video. Sony does bundle a basic video editing program with its MicroMV camcorders, though; with most other camcorders you have to buy one separately. Many digital camcorders can record from a composite or S-Video source, as well, so you can transfer video from an older analog camcorder onto digital tape.

CLOSE-UP

WHAT TO LOOK FOR IN A CAMCORDER

The Sony DCR-IP5 (left) and the Panasonic PV-DV702.

Recommendations

MANY DISSIMILAR digital camcorders are available, priced from $500 to $2000, so spending some time familiarizing yourself with the designs of various models before buying is worthwhile; the way a camcorder feels in your hands can be an important factor. Smaller camcorders (such as the Sony DCR-IP5) often cost more than larger ones, but you can carry them in a pocket. Though plenty of cheaper models exist, we recommend you spend a little extra on a camcorder that includes a wider range of features, such as the Panasonic PV-DV702, a unit that has a bright, large LCD screen; a zoom microphone; and both long-shutter-speed and infrared low-light recording modes.

—Richard Baguley ▶

PDAs

WHAT MATTERS: For simplicity look to a Palm OS-based device, and for a Windows look and feel go with a Pocket PC model.

Sony Clié PEG-NR70V

WHILE PDAs of one type or another have been around for about a decade, the technological advances now being incorporated into them have made these devices even more attractive, particularly if you want something more than just an electronic version of a paper organizer.

Increasingly speedy processors are suddenly bringing the much-hyped "instant information at the touch of a button" cliché a lot closer to reality. Sharper, more energy-efficient color screens that equal high-end notebooks in image quality are becoming more widely available.

The ability to communicate wirelessly enhances PDAs' overall utility, making them useful for instant e-mail, instant messaging, and even phone calls. Though many PDAs today can browse the Internet, the transmission speed has been so glacial as to make this feature virtually unusable. But devices scheduled to appear starting in late 2002 will have integrated 802.11b wireless networking and high-speed third-generation (3G) support.

Key Features

➤ **PLATFORM:** Three different types of PDAs exist now: the organizer with some PC features (Palm); the handheld PC with organizer features (Pocket PC); and the wireless e-mail/pager with organizer features (RIM BlackBerry). Though these platforms used to be distinct, the boundaries have blurred. Some formerly BlackBerry-exclusive functions, such as persistent connections, have found their way into Palms (the Palm I705), and numerous Palm and Pocket PC–type apps have crept into BlackBerry systems.

➤ **OPERATING SYSTEM:** How you plan to use a PDA can suggest the operating system you should choose. Palm OS–based devices—such as PDAs from Palm, HandEra, Handspring, and Sony—dominate the PDA market because of the operating system's simplicity. Unlike Windows or the Pocket PC OS, the Palm OS cannot multitask: It opens just one app at a time. Unless you use a third-party synchronization utility, the Palm OS will synchronize appointments and contacts only with its proprietary PC PIM, the Palm Desktop; most Palm OS vendors bundle an Outlook filter to sync with that desktop PIM. You'll need Dataviz's Documents to Go, Cutting Edge Software's Quickoffice, or similar software to create and edit Microsoft Office–compatible documents on a Palm OS device.

Microsoft's Pocket PC is basically a considerably shrunken version of its desktop Windows OS and includes Pocket PC versions of Microsoft Office applications such as Outlook, Word, Excel, and PowerPoint that let you create and edit documents as you would on your desktop. The integrated Windows Media Player handles MP3, WMA, and other multimedia files. Pocket PCs are available from Casio, Fujitsu, Hewlett-Packard, and Toshiba, among other vendors.

The RIM BlackBerry OS is primarily a wireless e-mail system that synchronizes e-mail messages and calendar items with the major enterprise-collaboration environments, Microsoft Exchange (Outlook) and Lotus Domino (Notes).

➤ **INTERNAL MEMORY (RAM):** Basic organizer functions (appointments, alarms, contact lists, tasks, and memos) use a fraction of the 8MB of RAM that most Palm OS PDAs hold. Color applications require more memory, however, and adding third-party utilities and games quickly eats up RAM, so look for a 16MB Palm OS device if you plan to load lots of extra programs. Apps on Pocket PC devices

FEATURES COMPARISON

PDA PICKS

	PDA	Specs	Comments
1	Sony Clié PEG-NR70V ★★★★½ NEW find.pcworld.com/25621	• $599 ($100 less without camera) • 16MB RAM, Memory Stick slot • 320-by-480-pixel color screen • 7 ounces	Elegantly designed, this model comes with a built-in digital camera, an integrated thumb-keyboard, a clever 360-degree swiveling screen, and a set of headphones.
2	Toshiba Pocket PC E310 ★★★★½ NEW find.pcworld.com/27821	• $399 • 32MB RAM, Secure Digital card slot • 240-by-320-pixel color screen • 4.9 ounces	The sleekest and lightest Pocket PC device sports a bright color screen, a navigation wheel, and a headphone port for digital music. For the price, this is a true bargain.
3	Palm I705 ★★★★☆ NEW find.pcworld.com/22181	• $449 • 8MB RAM, Secure Digital card slot • 160-by-160-pixel monochrome screen • 5.9 ounces	An always-on wireless network allows e-mail, instant messaging, and Net browsing. The copious software bundle includes a word processor, spreadsheet, and photo viewer.
4	Palm M515 ★★★★☆ June 02 find.pcworld.com/29819	• $399 • 16MB RAM, Secure Digital card slot • 160-by-160-pixel color screen • 4.9 ounces	Housed in a tapered metal case, this Palm has a bright color screen that's easy to read in all lighting conditions. It's one of the lightest and thinnest PDAs available.
5	Compaq IPaq H3850 ★★★½☆ Apr 02 find.pcworld.com/21586	• $579 • 64MB RAM, Secure Digital card slot • 240-by-320-pixel color screen • 6.7 ounces	Though it has a large screen and ample memory, this otherwise outstanding PDA is somewhat marred by comparatively outsized dimensions and hefty weight.

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require even more memory, especially to play audio or video; consider a unit with more than the minimum 32MB of RAM, preferably 64MB. You will still need an external memory card (see below) as well, to load your digital music and images on.

➤ **EXPANDABILITY:** Most PDAs other than BlackBerry devices carry external expansion slots to accommodate additional storage in the form of CompactFlash cards, Secure Digital cards, or Memory Sticks. (Early Handspring models included a proprietary Springboard module slot.) These slots can also hold add-ons such as cameras, MP3 players, phones, and GPS mapping antennas.

➤ **INPUT (KEYBOARD OR STYLUS):** The handwriting recognition capabilities on Palms and Pocket PCs have improved over the years, and all PDAs come with a virtual hunt-and-peck on-screen keyboard. Still, many users have turned to one of the numerous third-party add-on keyboards. Some enterprising vendors such as Sony and Handspring have put thumb keyboards on their latest PDAs—without eliminating styluses—so you can choose the method of input you prefer.

➤ **SIZE AND WEIGHT:** Ideally, a PDA would fit in a shirt pocket without stretching it out of shape. But while a few can do that, many PDAs are too bulky and heavy to be called truly pocket-size. The lightest weigh about 4 ounces and measure about 4 inches high, 3 inches across, and 0.5 inch thick. A dress-shirt pocket can handle that easily—give or take an ounce. Any of the Palm-brand models, such as the M515 or I705, fit the bill (and the shirt) well. The Toshiba Pocket PC E310 does too. Though Sony's Clié PEG-NR70V is thin, at 7 ounces it is a tad too heavy for a pocket. The bulky 0.75-inch-thick Compaq IPaq stands at the other extreme.

➤ **BATTERY POWER:** Bright color screens definitely make the PDA experience more pleasant, and they support more software choices than monochrome screens do. While Pocket PCs once laid claim to the highest-resolution TFT screens, some Palm OS PDAs now do as well. Currently two different technologies provide bright displays. The more common is backlighting, which illuminates the screen at some cost to battery life. Reflective screens, the other technology, still have backlighting but work well in outdoor or brighter ambient light without it. Before purchasing a PDA, check to see how well you can read the screen with the backlight off.

Rechargeable batteries, typically lithium ion, are more efficient today, as are the power control options on PDAs, but most monochrome and lower-end models still use AAA batteries. That said, you can expect up to a month of power between charges from some monochrome units, but no more than 10 hours of life from color-screen units with typical usage.

CLOSE-UP

PALM VS. POCKET PC

The Compaq iPaq H3850 (left) and the Palm M515.

Recommendations

IF YOU SIMPLY need to maintain an up-to-date appointment calendar, contact list, and to-do list when you are away from your PC, your best bet is to stick with Palm OS devices. Their easy-to-use data synchronization stands out. However, Pocket PC devices handle PC-like apps better while still offering conventional scheduling and contact synchronization. But this higher functionality can add up to a more complex system to master.

If the demands of real-time e-mail communication for enterprise connections drive your PDA needs, the RIM BlackBerry device makes the best choice. For individual instant e-mail, a wireless Palm OS device such as the Palm I705 is the way to go. Whichever one of these you choose, you'll need to pay a monthly wireless communications charge, as well.

—*Michael S. Lasky* ▶

Wireless Phones

WHAT MATTERS: A mobile phone's voice and data capabilities are only as good as the wireless service plan that goes with them.

Motorola V70

MOBILE PHONES have become more than just convenient communication tools. But choosing a phone—and the service plan to go with it—requires some legwork.

Your choice of phone almost always depends on your choice of wireless service provider. With few exceptions, mobile phones work only on one provider because carriers have exclusive networks.

Next year, carriers will release the third generation of mobile communications technology, called 3G, which is supposed to deliver data transfers up to 2 megabits per second, compared with the current data transfer rate of up to 115 kilobits per second. 3G will be handy if you use a phone for wirelessly accessing data such as e-mail, text messages, and the Web.

Also on the horizon is Microsoft's Smartphone 2002 platform—a pared-down version of the Pocket PC OS that will support Outlook, Internet Explorer, and Windows Media Player. Samsung and Sendo plan to release pocket-size handsets running this platform, and Cingular Wireless says that it will support it.

Key Features

➤ **WIRELESS STANDARD:** World travelers are more affected by this than users based strictly in the United States, because most of the world uses networks based on the Global System for Mobile Communications standard. In addition to GSM, U.S. carriers work on the Code-Division Multiple Access and Time Division Multiple Access standards. Because carriers run on different networks, you can't, for example, use a Sprint PCS phone on Cingular's service.

➤ **WIRELESS MODE:** Choose a dual-mode mobile phone, which sends and receives both digital and analog signals. It can fall back on analog service if a digital signal is unavailable, though roaming fees apply.

➤ **BAND SUPPORT:** Tri-band phones operate across three frequency bands. Theoretically, they provide better coverage than dual- or single-band phones. Tri-band world phones, which are compatible with three GSM frequencies—900 MHz (mainly in Europe), 1800 MHz (in Asia), and 1900 MHz (in the United States)—can function around the globe. Some tri-mode phones will work on two digital frequencies and an analog network.

➤ **DESIGN:** You can choose between flip-open and nonflip phones. To screen calls via caller ID, get either a nonflip model or a flip phone with a caller ID screen on the cover. If you buy a nonflip unit, make sure it has a keypad lock that prevents inadvertent dialing. Also consider ergonomics: Can you hear callers without constant adjustment? Can you use the phone with one hand? For example, you can't easily hold a slim phone to your ear by scrunching your neck and shoulder.

➤ **SIZE AND WEIGHT:** A typical nonflip mobile phone weighs about 4 ounces and is about the size of an energy bar—5 inches long, 2 inches wide, and an inch thick. Anything above that is considered large. Exceptions: phone/PDA hybrids such as Kyocera's 7135 Smartphone and Handspring's Treo units (each about the size of a pack of cigarettes), and Samsung's I300 (typical handheld size).

➤ **BATTERY LIFE:** Most new phones allow at least 3 hours of talk time and six days on standby. Some phones, including Nokia's, can last up to 14 days on standby. Of course, usage affects battery life,

FEATURES COMPARISON

WIRELESS PHONE PICKS

	WIRELESS PHONE	Specs[1]	Comments
1	Sony Ericsson T68 ★★★★☆ NEW find.pcworld.com/29852	• $200 • GSM 900 MHz/1800 MHz/1900 MHz • 3 ounces; 3.9 by 1.9 by 0.8 inches • 7-hour talk time; 8 days standby	Inexpensive, compact phone packs joystick navigation button, color screen, and world roaming. Available through AT&T Wireless, Cingular, and T-Mobile.
2	Motorola V70 ★★★½☆ NEW find.pcworld.com/29840	• $400 • GSM 1900 MHz • 2.8 ounces; 3.3 by 1.8 by 0.8 inches • 4-hour talk time; 6 days standby	Smallest, most innovatively designed phone of this group has unique swiveling cover and circular display, though the keypad is a bit small. Available through Cingular.
3	Handspring Treo 270 ★★★½☆ NEW find.pcworld.com/29651	• $499 • GSM 900 MHz/1900 MHz • 5.4 ounces; 4.2 by 2.8 by 0.8 inches • 3-hour talk time; 6 days standby	Combines phone and PDA into the highest-priced, only Palm OS-compatible device here. Has a color screen and a tiny keyboard. Available through Cingular and T-Mobile.
4	Nextel Motorola I90c ★★★☆☆ NEW find.pcworld.com/29843	• $250 • IDEN 800 MHz (based on TDMA) • 4.8 ounces; 3.5 by 2 by 1.1 inches • 3-hour talk time; 3 days standby	Flip-up, Java-enabled phone with separate caller ID screen on the cover is the only model here with speakerphone and two-way radio capability. Available through Nextel.
5	Nokia 6360 ★★★☆☆ NEW find.pcworld.com/29846	• $150 • TDMA 800 MHz/1900 MHz • 4.2 ounces; 5 by 1.8 by 0.9 inches • 5-hour talk time; 14 days standby	The most affordable phone on our list has voice recorder, internal (rather than pull-out) antenna, and six-line text display. Available through AT&T Wireless.

Visit find.pcworld.com/30158 for more rankings and product reviews.

[1] Street prices are reported as of 6/12/02, with service activation.

PHOTOGRAPHS: MARC SIMON; ILLUSTRATION: CELIA JOHNSON

and (depending on the phone) recharging the battery may take an hour or longer.

➤ **SCREEN:** If you intend to send and receive text messages, surf the Web, or use a built-in organizer, look for a phone that displays at least six lines of text. Anything less will make your eyes—and your thumb—sore from the scrolling. Some handsets let you adjust the font size to fit more text on screen, but the more digits you pack in, the tinier they get. Consider a phone/PDA hybrid (from Handspring, Kyocera, Nokia, or Samsung) if you plan to go online–hybrids offer larger screens than standard mobile phones do.

Make sure you can adjust display contrast and backlight strength; they make text and graphics easily viewable, even in bright places. Phones with color screens can make text easy to read, but you'll usually pay for that perk in short battery life.

➤ **KEYPAD:** The menu system and keypad layout should be intuitive, and the buttons easy to press. Look for a joystick-style knob (such as the one on Sony Ericsson's T68) that simplifies menu navigation. Most handsets, however, come with up/down and left/right arrow keys.

Phone/PDA hybrids such as Handspring's Treo come with a tiny keyboard that makes data entry less complicated than touching a keypad on a handheld screen like those on Samsung's I300.

➤ **CALL FEATURES:** New phones are loaded with call-management features like phone books, call histories, and speed dialing. Some handsets (including a few from Kyocera and Nextel) even come with a speakerphone. Nextel also offers models that function as a two-way radio connecting you with other Nextel users in your group. This feature doesn't count as airtime—great for roving staff. Enabling other features such as call waiting, caller ID, and voice-activated dialing requires activation from a carrier.

For security features, look for a phone that restricts outgoing and incoming calls, locks the keypad, and protects or mass-deletes phone book entries. If you want to talk on the phone hands-free, get a headset or an earpiece. For cord-free calling, consider a wireless, Bluetooth-enabled headset; Sony Ericsson and Nokia offer phones with this extra-cost accessory.

➤ **WIRELESS DATA:** Though few people exchange data wirelessly through their phones, nearly all new models can send and receive e-mail and SMS (Short Message Service) text messages, download ring tones and simple games, and connect to the Internet (usually through a minibrowser that works best with text-only versions of sites like Yahoo, Amazon, and CNN). The availability of such features depends on your service plan.

Going online while you're waiting for the elevator is a cool idea, but most mobile phones connect at slow speeds: 8 kbps on current GSM networks, or up to 19.2 kbps on networks using a technology called CDPD (Cellular Digital Packet Data). One step toward faster transfers is a technology called GPRS (General Packet Radio Service), a wireless standard that can run at speeds up to 115 kbps. Some phones from Motorola, Nokia, and Sony Ericsson are compatible with GPRS; Cingular and T-Mobile offer it. Faster still is 3G, which we expect carriers to roll out next year.

➤ **PHONE SERVICE:** Not all networks are created equal. Service can be erratic even if a carrier claims to have coverage in an area; reception quality varies, too. Before you buy, try the service and one of its phones; some providers (including Verizon) offer free trials. Poll friends and colleagues about their experiences.

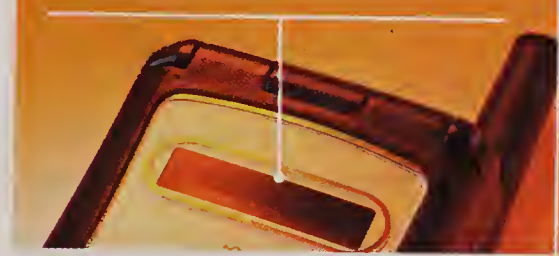
Travel cross-country? Sign up for a national plan, so you can send and receive calls anywhere in the United States and in parts of Canada without incurring extra charges; with local or regional plans you must pay roaming fees outside your area. To use a world phone in other countries, you'll need international roaming service.

Carriers offer discounts if you sign a one-year or longer contract (break it, and you'll get hit with hefty fees). Signing up for more minutes than you'll likely use per month will ultimately cost less than a lower base with additional per-minute fees. Services like wireless Web, e-mail, and text messaging cost extra. Look into replacement plans or extended warranties, which entitle you to a new phone if yours is lost, gets stolen, or goes kaput.

CLOSE-UP

DIALING FOR FEATURES

Sony Ericsson's T68 features a joystick-style navigation button.



Nextel's clamshell-design Motorola I90c has a handy caller ID screen on the cover.

Handspring's phone/PDA hybrid Treo 270 has a large color screen for easy text viewing.

Its integrated, if tiny, keyboard helps simplify data entry.

Recommendations

THE SWEET SPOT: a compact, dual-band phone like Sony Ericsson's T68 that lasts for 3 or more hours of talk time. Globetrotters, look for a GSM-enabled, tri-band phone and international roaming service; check rates from AT&T Wireless, Nextel, and T-Mobile. In choosing a carrier, compare calling-plan rates and coverage areas.

—Grace Aquino ▶

MP3 Players

Samsung Yepp YP-90S

WHAT MATTERS: Today's players pack more songs than ever, and the devices are easier to manage, too.

A PORTABLE DIGITAL audio player sets your music free so you can easily mix and match songs in any order and take all the tunes with you. Hard drive–based players such as the Apple IPod have the greatest amount of storage space, but they also cost the most. Flash memory models are small but hold a limited number of songs. Though the media used by MP3 CD players is inexpensive, these devices have a certain nontrendy chunkiness to them.

Key Features

➤ **STORAGE:** If you want to house your entire music collection on just one device, consider purchasing a hard drive–based player—a 20GB drive holds about 5000 4-minute songs compressed at 128 kilobits per second. Flash memory–based models generally max out at 128MB (that works out to approximately 30 songs at 128 kbps), but their tiny size is a bonus. Look for a model that permits you to add memory through either CompactFlash or SmartMedia cards, which cost about $70 for 128MB. Even if you spring for the expansion media, however, you may quickly outgrow the player. MP3 CD players like the IRiver America IMP-350 SlimX are the size of standard portable CD players, but they use inexpensive CD-R or CD-RW discs (one disc can hold about 10 hours of music, or 150 songs at 128 kbps).

➤ **FILE MANAGEMENT:** MP3 files include ID3 tags that list the artist, track, album name, genre, and more. Working with this data, a player can organize the files for you. Most hard drive–based players sort files into artist, song title, and genre lists, and can read playlists that you create with software like Musicmatch Jukebox. You obtain song information easily via software enabled to work with an online track-listing database called the Gracenote CDDB Music Recognition Service, or you enter the info manually. Look for an easy-to-read LCD screen that shows the information you frequently use.

➤ **TRANSFER SPEED/PORT TYPE:** Most players today use the USB 1.1 interface, but downloading one 5GB batch of songs from your PC can take all night. Look later this year for players that employ the much faster USB 2.0 standard. With FireWire (IEEE 1394) you can transfer an entire song in seconds, but few PCs have a FireWire port. (You can add a FireWire PCI card to your PC for as little as $50.)

➤ **SOFTWARE:** All players come with software that allows you to download songs to them. Some of the more popular units have drivers you can use within RealOne or Musicmatch Jukebox; this permits you to rip from a CD-ROM and download the resulting MP3 file to your player from the same application. Other players, such as the Pogo RipFlash, come with their own specialized software. And some hard drive–based players appear as a drive within Windows Explorer, so you can drag and drop files into the device.

Recommendations

FLASH-BASED players are easy to tote and have reasonable starting prices. Good-value MP3 CD players usually retail for less than $200, and additional blank discs are cheap. You get a two-fer with hard-drive players, though they cost more initially: You can carry a huge music collection in a fairly portable device, and such players often have intuitive file management systems and clear LCDs that display song information. The bottom line? Look for a player that holds the most songs in the smallest package you can afford.

—Michael Gowan ▶

FEATURES COMPARISON

MP3 PLAYER PICKS

	PLAYER	Specs	Comments
1	Apple IPod ★★★★☆ NEW find.pcworld.com/29810	• $499 • Hard drive • 10GB storage • Plays MP3 files	This expensive, sleek player has intuitive file management and navigation. Its FireWire interface allows for fast file transfers. However, it requires a download of one of several software packages to work with Windows.
2	Samsung Yepp YP-90S ★★★★☆ NEW find.pcworld.com/29813	• $190 • Embedded flash memory • 64MB memory • Plays MP3, WMA files	This tiny player can tuck into almost any pocket. A clear display simplifies navigating the stored music. Comes with a USB 1.1 connection, an FM tuner, and a voice recorder, but its memory cannot be expanded.
3	Sonicblue RioRiot ★★★½☆ July 02 find.pcworld.com/27741	• $350 • Hard drive • 20GB storage • Plays MP3, WMA files	Thanks to its large, crisp LCD screen, the RioRiot makes managing and navigating its vast storage space easy. File transfers via its USB 1.1 interface are slower than on other USB 1.1 devices, however. Also has an FM tuner.
4	Pogo RipFlash ★★★½☆ NEW find.pcworld.com/29814	• $129 • Flash memory • 32MB memory • Plays MP3, WMA files	This small player includes a ton of features: a good price, expandable memory (SmartMedia), voice recording, and a USB 1.1 interface. Also records audio directly to an MP3 file from the line-in port, but the MP3 quality is poor.
5	IRiver America IMP-350 SlimX ★★★½☆ NEW find.pcworld.com/29815	• $180 • CD • No internal memory • Plays MP3, WMA files	Well named, this sleek player has upgradable firmware and an FM tuner, and its LCD screen is conveniently located on the handy remote. However, it has limited options for managing and navigating its stored music.

Street prices are reported as of 6/26/02. Visit find.pcworld.com/30098 for more rankings and reviews.

PHOTOGRAPH: MARC SIMON; ILLUSTRATION: CELIA JOHNSON

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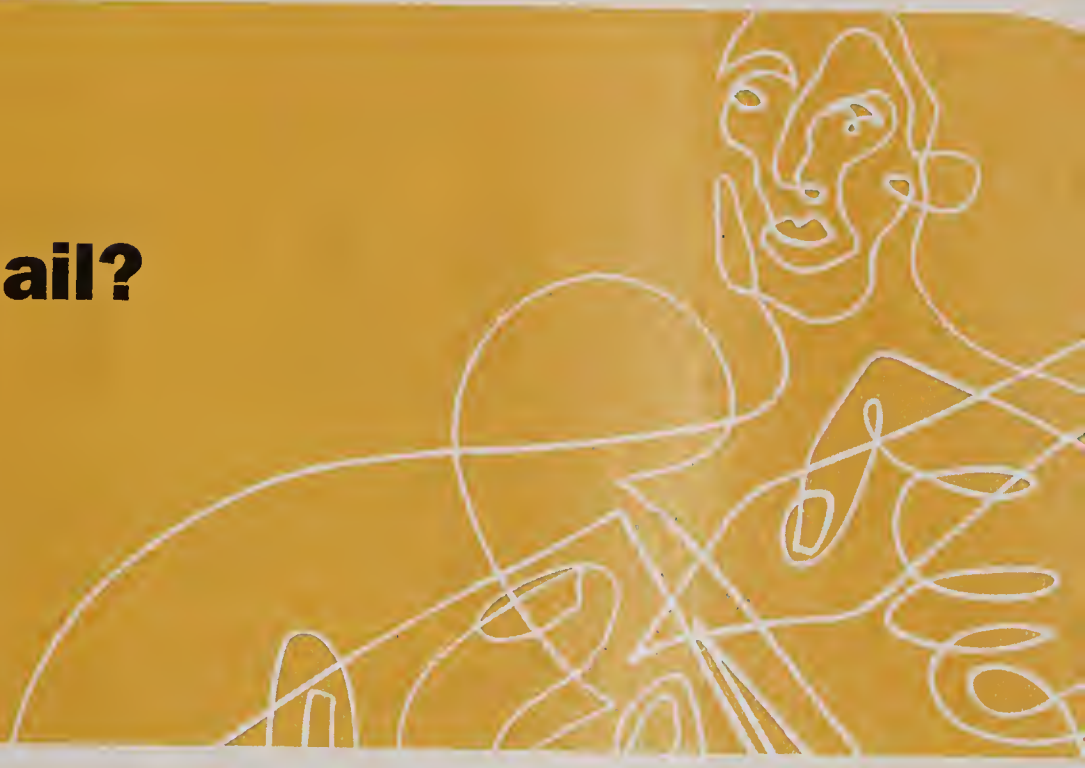

Remember the days when email was a good thing? It brought you the information you needed fast, and enabled you to respond instantly.

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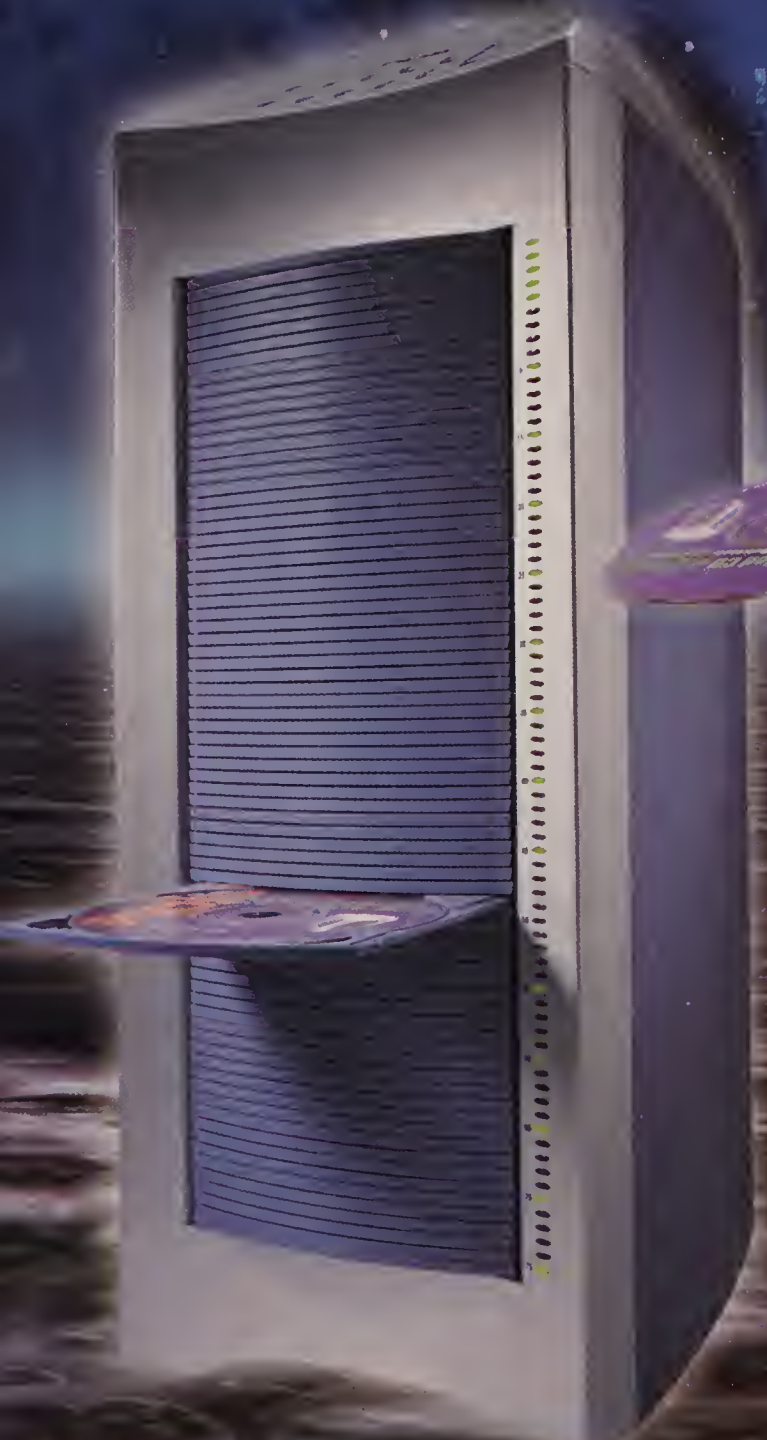

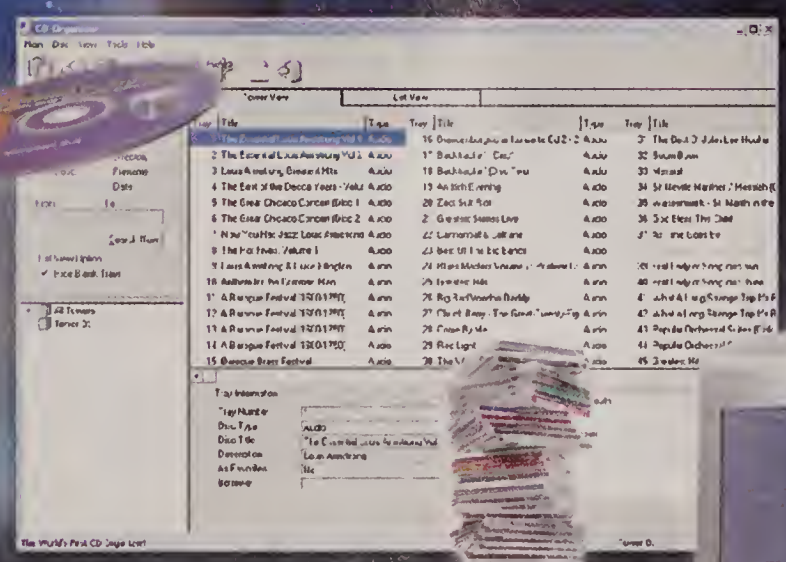

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SUCH A

THE BEST & WORST PLACES TO BUY ON THE WEB

From big names to cheap no-names, we rate today's PC gear sites for price, selection, and service.

BY ANNE KANDRA

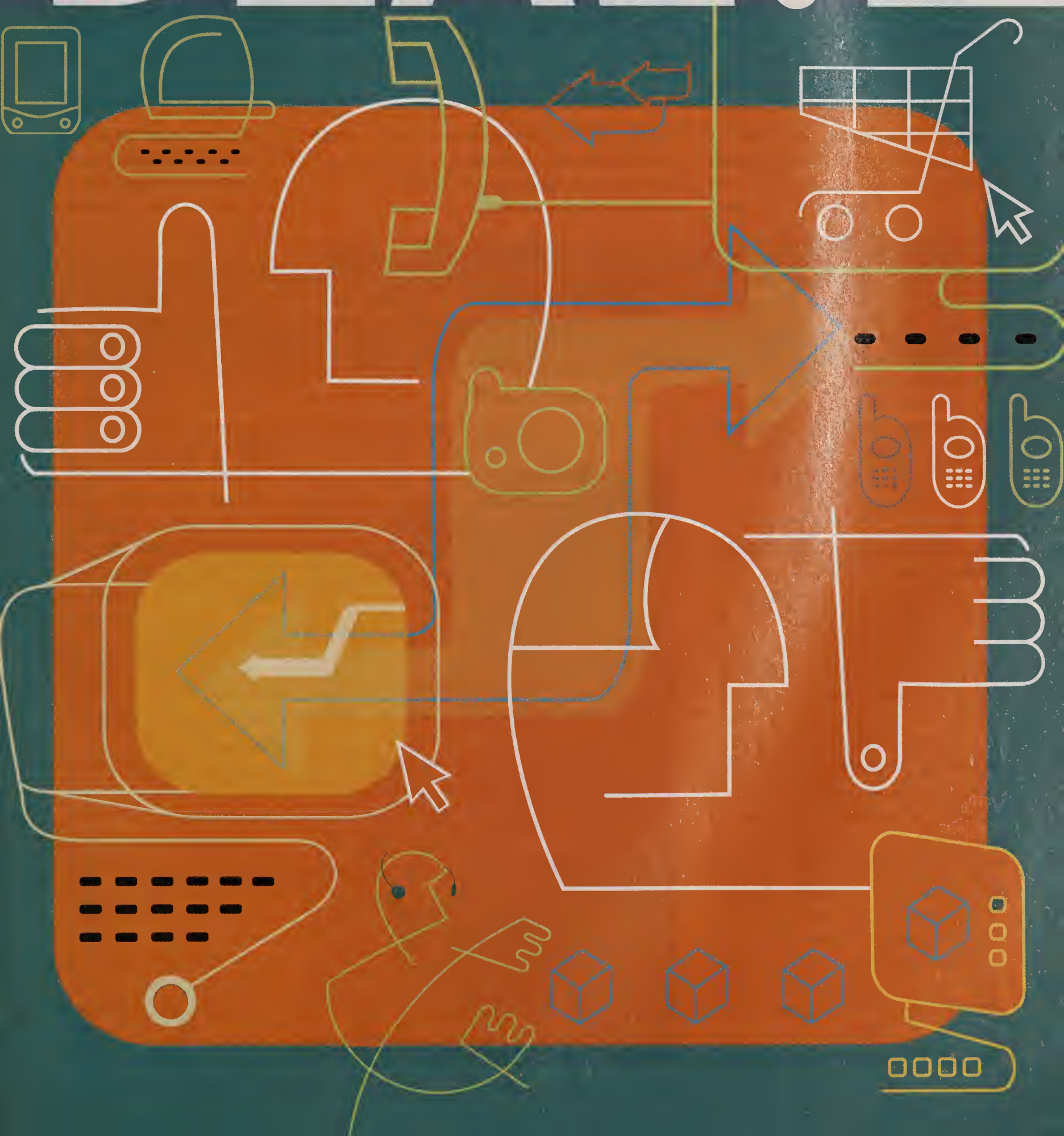
I'M BROWSING an online store whose home page features a slick-looking sales rep in shades hawking deals on digital cameras, laptops, and so on—a little cheesy-looking, maybe, but the price is right. Another site's home page is more cluttered than my eight-year-old's bedroom floor, but it offers free shipping. Still another site has a clean layout, lots of product information, and a trusted name, but yikes—high prices!

Choosing where to buy stuff online can be a baffling experience. You want a great price, but not if it means crummy service or shady deals. You also want a site that's easy to get around and tells you everything you want to know—from full product specs to total price with shipping to return policies. Finally, you want a site that'll be there for you if there's a problem.

To find out where you can get the best bargains and service, we shopped at a dozen online computer stores. Our goal? To locate the smoothest overall shopping experience—and to cull the sleazy vendors from the virtuous. In the end, we were pleased to find more good guys than slimy sales reps, though we still encountered snafus. Here's our story. ▶

ILLUSTRATIONS BY CELIA JOHNSON

IDEAL?



HOW WE TESTED

WE ORDERED FROM big-name vendors Amazon.com, Buy.com, CDW, Computers4Sure, Dell, ECost, Micro Warehouse, Outpost.com, and PC Connection, along with no-name stores—A2Z Computers, MP Superstore, and TigerDirect—that often show up on shopping search engines because of their low prices. From each store, we bought an IBM ThinkPad R31 notebook, an Olympus Camedia D-40 Zoom digital camera, a 19-inch NEC MultiSync FP955 monitor, and a copy of Microsoft's Office XP Standard Upgrade. If a store didn't have what we wanted, we bought a similarly configured substitute.

We also comparison-shopped 16 other products—from PCs to PDAs to security software—by checking their availability, price, and shipping costs at every store.

We evaluated sales and return policies, shipping options, and overall ease of use. We ordered online and called customer service along the way to test its efficiency. As stuff arrived, we unpacked and powered up each item except the software. Then we returned the items for refunds.

THE BIG PICTURE

OUR BEST EXPERIENCE was at Computers4Sure (which is owned by Office Depot), thanks to its easy-to-navigate site, terrific selection, and helpful service. PC Connection, CDW, and Micro Warehouse also came out near the top of our list for their good selection, fair prices, and reliable service. Our gripe: Vendors should make a greater effort to tell shoppers which items are nonreturnable (although Computers4Sure and PC Connection made exceptions by taking products they initially said couldn't be returned).

A2Z and TigerDirect get our booby prize for bungling every step of our shopping experience. A2Z had a lost order, indifferent customer service, and apparently used software being sold as new; TigerDirect had little selection, aggressive marketing, and distrust of its customers.

As for the other sites, each had a major glitch that landed it in the middle. Dell took weeks to refund money for a couple of returned items, and its phone customer service can be like an Escher print: loops leading nowhere. Buy.com makes it difficult to talk to a rep. ECost has a tough return policy, MP Superstore's selection is limited, and Outpost.com's site design is clunky and hard to navigate. And while Amazon.com is a great place to buy books and CDs, we'd go elsewhere for PC gear.

Selection: Puny to Plenty

OF THE 12 SITES, CDW had the broadest selection of computer products, offering 19 of the 20 on our list. Computers4Sure also did well, offering all but 2. Most of the other vendors had 14 to 16 of the products available.

MP Superstore and TigerDirect had the slimmest selection, offering only four and five of the products, respectively. Both companies offered other models by the same maker for some of our items, and we had the impression that TigerDirect tends to sell a vendor's low-end product lines—for example, it sells NEC-Mitsubishi's $270 AccuSync 95F monitor but not the $395 MultiSync FP955. Also, MP Superstore offers hardware only—you can purchase almost anything from a microwave oven to a clock radio, but not software.

> Buy.com's rules for exchanges are 'a nonsense policy for which they have no justification.'

Pam Falcioni, Web designer

In addition to selling PC gear, most of the resellers offer extended warranties. TigerDirect takes an earnest approach in this area. At checkout, I was beseeched with a "special message" from Carl Fiorentino, president of TigerDirect.

Carl apparently understands that I can't afford to have my machine go down, and goes on to explain that peace of mind is just a click—and about $200—away, in the form of TigerDirect's extended warranty.

Turning down the warranty is as simple as clicking the "no" option (which is the default), and you don't have to read Carl's plea, which says that you'll never pay for any "approved repair" but neglects to specify what's "approved." Always compare an extended warranty against the maker's.

PHOTOGRAPH: ROBBIE McCLARAN

Usability: Clean vs. Clunky

WHAT'S MORE FRUSTRATING than a Web site that doesn't sell what you want? One that sells the item but makes it impossible to find.

To test each Web site's ease of use, I plugged the manufacturer number of each product into the search field to make sure I got the correct item in one click. Manufacturers' product numbers are available from their Web sites and at pricing search engines like PriceGrabber. Five of the 12 sites—A2Z, CDW, Computers4Sure, ECost, Micro Warehouse, and PC Connection—found every item by its number on the first try, and most others came up with at least one or two.

It's a good thing that A2Z's search feature found most of the products right away, because the site's design is clunky and hard to negotiate. The home page lists three categories: Computers, Notebooks, and, obscurely, Barebones (which consists of computer cases, processors, memory chips, graphics cards, fans, and so on), along with several dozen subcategories for specific components.

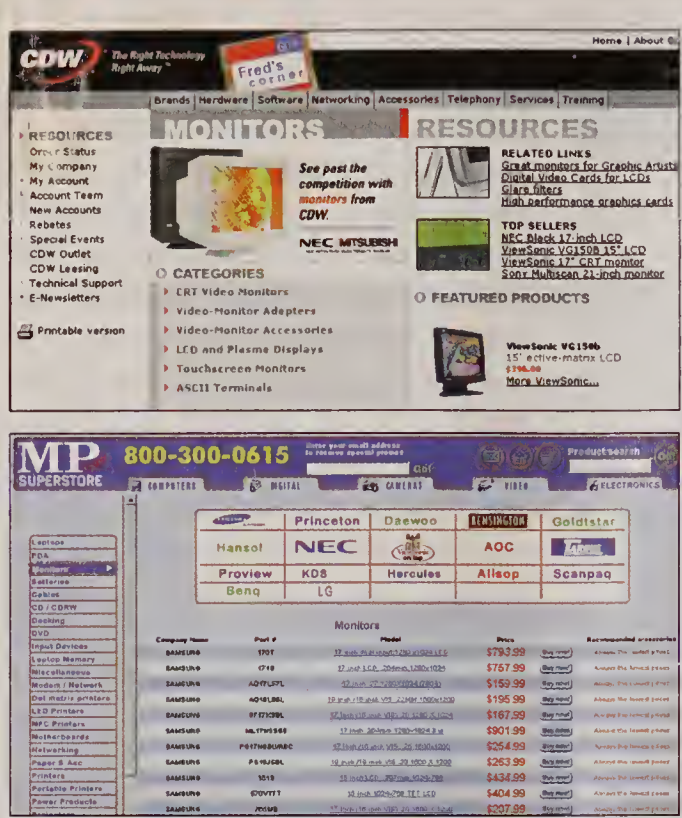
Speaking of bare bones, that generously describes A2Z's product information. When I linked to the IBM ThinkPad (which wasn't in stock), I got a cryptic list of abbreviated configuration details (the product description read "TP R31 P3/1130 128MB 30GB 14.1 DVD 56K ETH W2K"); it tells you what you want to know if you speak geek, but it would have been nice to see a description using actual words and sentences, and maybe a product photo. In fact, the model name of the notebook wasn't even listed anywhere, so it took me a while to confirm that I had indeed found the right item. ▶

FEATURES COMPARISON

SHOPPING SITES: COMPUTERS4SURE LEADS THE PACK

ONLINE STORE	Out of 20 products, it had...	Products' cost vs. average cost at other stores	Bottom-line price before purchase [1]	Site design and navigation	Product descriptions and photos	Restocking fee	Refund within...[2]	Comments
Computers4Sure ★★★★½ www.computers4sure.com	18	2 percent more	Yes	**Excellent**	**Excellent**	**None**	2 to 5 days	All-around decent online store offers a great selection of computer products. Provided good service on our orders.
PC Connection ★★★★☆ www.pcconnection.com	12	7 percent more	No	**Excellent**	**Excellent**	**15 percent**	5 to 7 days	Gives helpful information on its Web site and easy checkout process, but has so-so selection.
CDW ★★★½☆ www.cdw.com	19	4 percent less	Yes	**Very good**	**Very good**	**None**	3 to 6 days	Has the best selection here and an easy-to-navigate site. But no returns on several PC brands, including IBM.
Micro Warehouse ★★★½☆ www.microwarehouse.com	16	1 percent less	No	**Good**	**Good**	**15 percent**	3 to 5 days	Middle-of-the-road online vendor sells most of the items we looked for but has a weak search engine.
Amazon.com ★★★☆☆ www.amazon.com	16	7 percent less	Yes	**Good**	**Good**	**None**	15 to 43 days	Good return policies, and selection has below-average prices. But there's no phone ordering, and finding PC gear can be tedious.
Buy.com ★★★☆☆ www.buy.com	16	1 percent more	Yes	**Good**	**Good**	**15 percent**	4 to 20 days	Easy to find products, but it's very difficult to call company with questions. Hard-sells extended warranty.
Dell ★★★☆☆ www.dell.com	14	2 percent less	No	**Good**	**Very good**	**15 percent**	4 to 49 days	Good prices, but took a long time to refund our money and put us through looping phone menus at customer service.
ECost ★★★☆☆ www.ecost.com	16	5 percent more	Yes	**Good**	**Good**	**15 percent**	1 to 7 days	Provides a pleasing shopping experience, but charges handling fee and you can't return things from several manufacturers.
Outpost.com ★★½☆☆ www.outpost.com	11	3 percent more	Yes	**Poor**	**Good**	**None**	3 to 5 days	Finding items was difficult. Site doesn't save user info for separate orders, unless you set up an Express account.
MP Superstore ★★☆☆☆ www.mpsuperstore.com	4	6 percent less	No	**Adequate**	**Adequate**	**15 percent**	8 to 28 days	Poor selection—it doesn't sell software. Web site is difficult to use, and product information is sparse.
A2Z Computers ★☆☆☆☆ www.a2zcomputers.com	14	3 percent less	No	**Poor**	**Good**	**None**	7 days	Offers good deals but doesn't list tax and shipping charges before you pay. Has a very clunky Web site and spotty service.
TigerDirect ★☆☆☆☆ www.tigerdirect.com	5	11 percent more	Yes	**Poor**	**Very good**	**15 percent**	2 to 5 days	Limits many products to second-class makers. Accepts no returns on software, even unopened. Pushes extended warranty.

[1] Bottom-line price includes tax and shipping fees. [2] Refund time frame is the time between products' return date (via overnight and standard deliveries) and credit issued by bank.



CLEAR VS. CLUTTERED: CDW (top) has an attractive site, while MP Superstore plainly lists brands and models.

At least at A2Z I knew where I was. At Amazon.com's home page, the main search field didn't recognize any of the manufacturer numbers I entered, and because Amazon recommends items that are closely related to the product I'm searching for, I found myself in cybermall hell, clicking through things I didn't need.

I eventually made it to Amazon's electronics store and located the products I wanted by entering the product name in the search field. This worked fine and was intuitive enough, but because the site tries so hard to be everything to everyone, you have to click through many levels to find what you're after. Thankfully, Amazon provides useful online tools to let you track your purchase, set up buying histories, compare product features, and return or even auction off unwanted items.

TigerDirect didn't recognize any of the products' manufacturer numbers either—mostly because, except for the software, it didn't sell any of the items on our list. Locating similar substitutes for the monitor, camera, and notebook took well over an hour. The site's home page is cluttered and text-heavy, and searching involves working your way through multiple screens as you narrow the listings. To its credit, TigerDirect's site does provide very thorough product descriptions and good—and enlargeable—photographs of its products.

Unfortunately, TigerDirect's user-friendly product descriptions don't make up for the relentless hounding that you're subjected to upon checkout. First comes the pitch for an extended warranty, but wait—there's more. Its customer information form asked me for my Social Security number, although the company no longer asks for this on its checkout page. Before the site confirms your order, you're hit up to buy a $50 monthly telephone service in order to get a "free" phone calling card. TigerDirect's final strike: Its order confirmation didn't include any price, tax, or shipping costs.

Another exceptionally kludgy site is Outpost.com (which is owned by computer retailer Fry's Electronics), where I spent more time searching for products than I did preparing for my last karate belt. Do a search using a product name, and you're forced to sort through endless lists. Try culling it down by using one of its other puzzling search parameters, and the whole thing is more trouble than it's worth. And don't ask me why, but as I searched the site in vain for my IBM ThinkPad, I somehow kept ending up on the "Board Sports" page. (Outpost sells toys, kitchen tools, and home goods along with its notebooks and network routers—good news if you're tempted to pick up a blender or a Trivial Pursuit game while you're shopping for a new PC.)

In contrast, PC Connection's site is clean and well organized, and it provides excellent product photos and descriptions, including details like compatibility notes and system requirements. CDW seems geared to IT departments; it has corporate-sounding titles like "Resources" and CDW@Work and includes categories for networking and telephony equipment as well as training and other business services. The site is a bit text-heavy but straightforward and easy to navigate.

Price: Wheelin' & Dealin'

A GREAT PRICE can tempt you into going with a dark horse over the tried-and-true. But remember to look at the whole picture. Sometimes that terrific bargain isn't so terrific after you factor in taxes, shipping, and other fees.

I found significant price variations on some of the items I bought—and some of the best deals came from big vendors. For example, Amazon had the lowest price for the Office XP Upgrade, at $193; A2Z was the priciest, at $240.

If saving nearly $50 isn't compelling enough, consider this: Amazon's software arrived shrink-wrapped and factory fresh, with all warranties, documentation, and discs intact. A2Z's shipment included a box full of packing peanuts with a scratched, dirty jewel case containing two smudged discs that looked liked they'd been handled before. The software also lacked any warranty or product documentation. "It must've been a shipping error," says an A2Z spokesperson. According to a Microsoft spokesperson, the software's product key is legitimate, although all genuine Microsoft software should come in a retail box with a license agreement, manuals, and a certificate of authenticity.

Some bargains came from small players like MP Superstore, which sold Olympus's Camedia D-40 for $505—about $100 less than most of the other vendors. Dell charged the highest camera price at $699.

All resellers let you choose the shipping method, from standard (the least expen-

sive option that takes about 5 to 7 business days) to overnight delivery. CDW offered the most choices by far, with more than 30 shipping alternatives.

I asked for standard shipping for everything I bought and found that costs varied more widely than you might expect. ECost, unlike others, charges a handling fee (although for our purchases this was offset by its free shipping offer if you spend over $500), and its shipping costs were generally higher than those of the other vendors. For example, I paid a steep $78 to ship the NEC monitor, compared to just under $40 at PC Connection, Computers4Sure, and several others.

Vendors often provide free shipping, especially for heavier items like monitors or desktop PCs, so it's worth scouting these deals out. Don't forget about sales tax—you'll have to pay it if the company you're buying from has a store, warehouse, or facility of any kind in your state.

Service: Highs & Lows

WHEN ONLINE SHOPPING works as it's supposed to, you can buy anything from PCs to antique coins without ever talking to a human being. Sound antisocial? Maybe. But if you've waited on the phone for a rep, a bit of antisocial behavior doesn't sound so bad.

Some companies, including Amazon and Buy.com, make it next to impossible to reach anyone by phone. But to be fair, Amazon puts enough information on its site that you'll probably find the answer to your question if you look hard enough. If not, you can e-mail the help department, as I did to ask why my credit card was turned down for one of my purchases. I got an e-mail response within an hour. In contrast, an e-mail query I sent to A2Z apparently went straight to the online circular file—I never got a response.

My shopping cohort, *PC World* Associate Editor Grace Aquino, had a less satisfying experience with Amazon's customer service. Her IBM ThinkPad order involved numerous e-mail messages but no computer. Amazon confirmed her order but could not process her payment; she had to go through Amazon affiliate EBS. She e-mailed EBS a few times to finalize the sale. Days later, an EBS rep e-mailed to say that the laptop was unavailable; he could order the product but could not guarantee when it would arrive. Aquino didn't bother with the order.

Most reps we spoke with were polite and knowledgeable, with a few exceptions. When our shopping researcher, Mick Lockey, called A2Z to check the price for Symantec Norton Internet Security 2002, he learned that it was a nonretail box copy without manuals. When he asked what recourse he would have if he had any problems, the rep responded, "Don't worry, it's a brand-new disc."

Sometimes you might know more than the rep does. Aquino called Outpost to arrange a return of Office XP and was told that the company didn't accept returns on software. When she pointed out that the site says unopened software boxes were returnable, the rep agreed. We wonder: Was he sneaky or just uninformed?

Bill Crawford, operations manager at the nonprofit Community Access Center in Riverside, California, had a more frustrating time with Outpost. He bought two scanners from the company. One scanner worked fine, but the other was dead on arrival. An Outpost rep told him to send the broken scanner back for a full refund. Crawford did, then waited and waited. When he called Outpost, reps would promise to call him back but never did. It wasn't until almost eight months after the purchase that he got the refund. The ▶

Crawford says his group 'loaned' Outpost $250, since the site took eight months to send a refund.

Bill Crawford, operations manager

PHOTOGRAPH: MANUELLO PAGANELLI

center, which helps people with disabilities live independently, survives on government funding and grants, Crawford says. "We do not have funds available to 'loan' businesses like Outpost $250."

But talking to customer service isn't always negative. MP Superstore e-mailed me, asking me to call. Uh-oh, I thought, here comes the pitch to buy more stuff. Turned out that the rep, Sam, called to tell me the IBM laptop was unavailable. He was helpful at providing alternatives.

Service at Computers4Sure, however, is a little worrisome. The reps sounded as if I'd interrupted naptime—one rep was bored and sleepy and another actually yawned while explaining return policies.

But at least they didn't argue with me, as the reps at TigerDirect did. When I called to find out why the Toshiba notebook I ordered never arrived, the rep brusquely informed me that the laptop was on back-order and he had no idea when it would be available.

I asked him to cancel the order. He sighed and told me he couldn't, mumbling something about the order "already being at the manufacturer." I told him to call the manufacturer, and he sighed and mumbled again. I heard the phone drop, followed by a long silence. As I was about to hang up, he returned and offered to let me buy another item. When I told him I just wanted to cancel the order, he sighed, mumbled, and dropped the phone again. After an even longer silence, he returned and grudgingly agreed to cancel the order.

Aquino also got a taste of customer service TigerDirect-style. When she asked to return her unopened copy of Office XP, the rep refused, explaining, "People could buy a shrink-wrap machine, copy the software, and return it as if it's never been opened." Now that's what we call trust.

Delivery: As Promised

SHOPPING AND SERVICE ASIDE, how did the companies do in delivering the goods? The good news: Almost everything I ordered arrived in time and in good condition—except for A2Z's incomplete Office XP. The bad news: Aquino didn't fare as well.

Once again, A2Z dropped the ball. More than two weeks after she ordered her notebook and camera, neither had arrived, although she had received an e-mail confirmation and her credit card had been charged for both purchases. She called a rep, who promised to look into the matter and call her back within 10 minutes.

No one called back. Aquino called again. Nobody at A2Z seemed to have any idea what had happened to her order. The order was canceled, and the accounting department promised a refund. Not only did she never get an explanation of why her order was lost, but her refund was short by $3. When she called to complain, the accounting rep she ▶

THE REAL MCCOY: Software should come in a sealed box with all documentation. The Office XP from A2Z (right) was incomplete.

SHOPPING TIPS

CAUTION: SHADY SITE AHEAD

SHOPPING SEARCH engines are great for sniffing out low prices, but they're lousy judges of character. If the site points you to a store of questionable integrity, be prepared to do a little background check of your own. Take your business elsewhere if you get three or more of these warning signs.

➤ **DIRT-CHEAP, EH?** Some stores deal in gray-market goods, selling things like digital cameras and other electronics intended for foreign markets. The warranty and manuals are likely to be useless in the United States. Confirm that the product is intended for American consumers.

➤ **CAN'T ORDER ONLINE?** Either the site isn't set up to process online payments—a red light in itself—or it asks you to call to close the deal, where you might end up in an endless sales pitch.

➤ **TOO MUCH INFORMATION:** Opt out if a vendor asks for your Social Security number or bank account information. A reputable site will require only your name, shipping and billing address, and credit card information—anything more should be optional.

➤ **NO COMPANY ADDRESS:** Some sites—even upstanding ones like Amazon—prefer you to contact them via e-mail and make it tricky to find phone numbers, but it should be listed somewhere. Call the number to make sure there's someone at the other end.

➤ **NO INFO ON POLICIES:** Always look for info on shipping rates, ways to track shipments, and sales tax. Also read the entire return policy before you place an order.

➤ **BAD GRAMMAR:** Poor writing indicates sloppiness. A company with a well-designed, well-edited Web site is generally more likely to put the same effort into customer service.

PHOTOGRAPH: MARC SIMON

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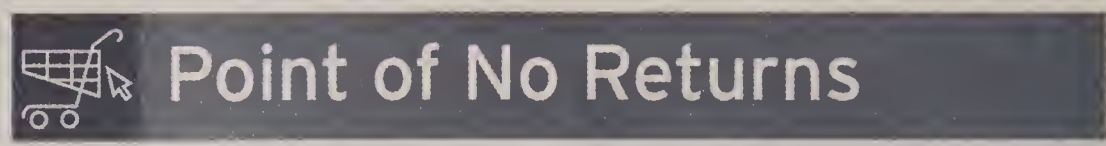
talked to couldn't explain that mistake either. She eventually got a full refund.

Aquino's other disappointment came from Amazon, which didn't deliver either of the items she ordered—first the notebook, then the digital camera. Since she'd received a confirmation of both the order and the shipment of the camera, she expected that to arrive. No luck—nearly two and a half weeks after her order, she got an e-mail from Amazon that said the camera was undeliverable, indicating that the shipping address (which was different from her billing address) was incorrect (even though the address indicated in the confirmation e-mail was accurate), so the camera would be returned to inventory and Aquino would be refunded for it.

"Shouldn't someone have called to verify the shipping address?" she notes. "If they tried to deliver on a Saturday when [my company's] mailroom was closed, shouldn't they have tried again on Monday?" Maybe not—after all, that would mean making a phone call.



Point of No Returns

AS YOU MIGHT EXPECT from any retailer, online computer stores want you to buy stuff. They don't want it returned. They'll do anything to keep you from returning it. That said, all the sites we shopped at do allow returns, but most have restrictions. Many of the stores exclude returns on products by certain manufacturers, such as Compaq, IBM, and others. Unless you read the site's return policy before you close the deal, you won't know that.

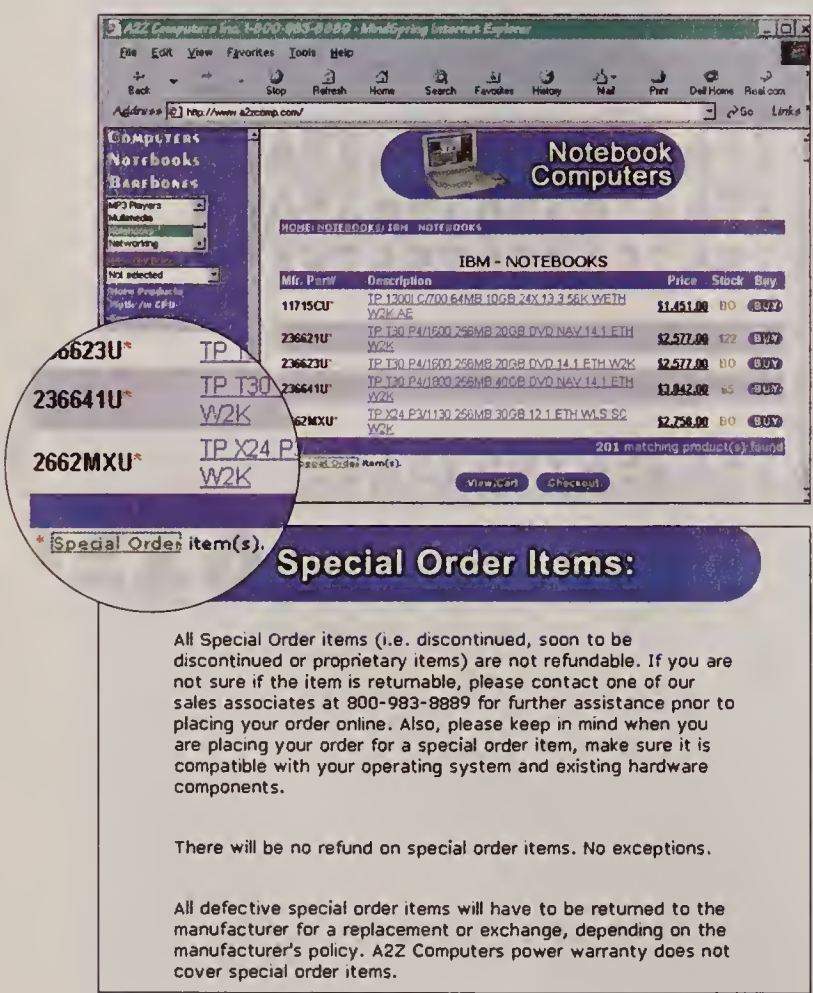
> Lie about a returned item at ECost—you pay 50 percent restocking.

Some sites have return policies that seem downright strange. Take Pam Falcioni's experience at Buy.com. Her father bought her a 100MB Zip drive but she wanted to exchange it for a 250MB version. Falcioni, a Web designer in Bend, Oregon, got the receipt from her father and contacted Buy.com.

She was astonished that they refused to accept an exchange from anyone but her father. She traded several e-mail messages with Buy.com reps, but never got a good explanation of the policy. "That was the most frustrating part," Falcioni recalls. "It's a nonsense policy for which they have no justification." In the end, she went to her local Staples store, where it took just minutes to exchange the drive for a higher-capacity one.

Always read the return policy before placing an order because there may be hidden rules. ECost's return policy, for example, excludes a large number of products, and the company has a clause that seems to have been written by a vengeful vice principal: If you claim to be returning an unopened box and are caught in a lie about that, the site will charge you a jaw-dropping 50 percent restocking fee (rather than the normal 15 percent). Take that, naughty customer!

While I didn't have any problems returning products to A2Z, the company does include a rather sneaky twist to its generous-sounding return policy. A large number of products are marked with an asterisk indicating "special order." These items are not returnable.



READ THE FINE PRINT: A2Z Computers' return policy is rather sneaky. The company marks many products on its site with an asterisk, which means the items are not returnable.

BROWSING FOR BARGAINS

IF YOU'RE IN THE MARKET for a new PC, or shopping around for a digital camera, should you go online? Sure. Plenty of Internet shops, such as Computers4Sure, offer good deals, dependable service, and an efficient shopping experience. But how do you find the best sites?

First, compare prices at different vendors, but don't just go for the cheapest one. Call or e-mail customer service to test its responsiveness—if a price looks suspiciously low, ask for more specific information, such as whether the item is new or used, and intended for U.S. consumers, and check the warranty terms. Finally, always read the company's terms of service, especially the vendor's return policy, before you buy. Armed with these rules, look to make some great deals. ■

Anne Kandra is the Consumer Watch *columnist for* PC World. *Additional reporting by* PC World *Associate Editor Grace Aquino and freelance writer Mick Lockey.*

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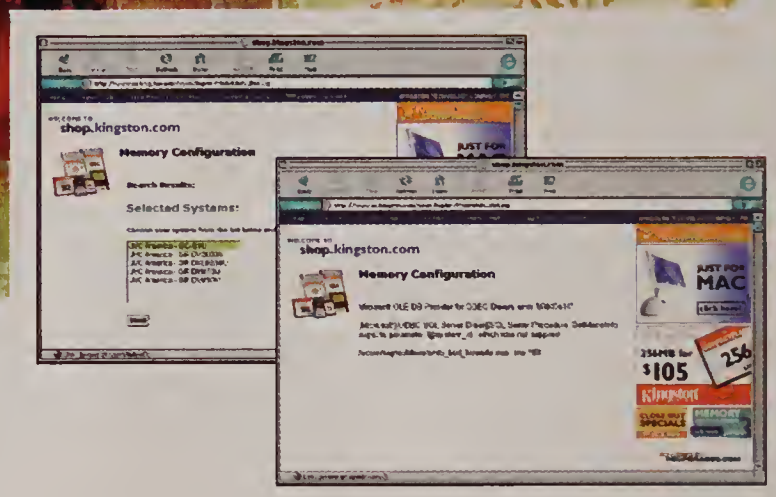

www.shop.kingston.com

Are you feeling a bit lost in your own digital universe? Do you know where to go when you've tapped your handheld PC's memory, or when you've run out of space on your digital camera?

Do you know who to trust with that MP3 library you can't live without?

As the world's largest third-party memory manufacturer, Kingston Technology Company Inc. has for years been helping PC enthusiasts upgrade the RAM in their PCs with demonstrations and system-specific memory guides at its retail Web site, www.Shop.Kingston.com.

Now many mobile users, from digital shutterbugs to PDA-wielding business travelers, are turning to Shop.Kingston.com for advice on their Flash and other memory upgrades.

Shop.Kingston.com's extensive searchable database takes the guesswork out of finding the right upgrade for digital devices, as well as PCs, Macs, and printers. A customer can use the site's unique and powerful Memory Configurator to find his system, and choose from a list of matching available upgrades.

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"If you're looking to get more digital music on your MP3 player, the Memory Configurator at Shop.Kingston.com can lead you to a 258MB CompactFlash upgrade that stores up to 100 songs," says Jason Jacobi, a Kingston spokesman.

"Or let's say you're looking for an SD upgrade card to store more photos on your new JVC MiniDV camera," Jacobi adds. "Shop.Kingston.com is going to have the 128MB SecureDigital Card you're looking for."

And shoppers can trust the Memory Selector to direct them only to those memory modules that are compatible with their systems. (Kingston actually guarantees the compatibility of all memory found through the Memory Selector.)

MEMORY YOU CAN TRUST, PRICES YOU'LL LOVE

Kingston each year builds and tests more than two million customized modules for hardware manufacturers and systems developers. Many of the world's leading PC makers install Kingston memory in their base systems.

Now Kingston is bringing that same quality memory, and the same guarantees, to individual users of mobile devices, at factory-direct prices.

And Kingston supports even novice upgraders with free tutorials and installation guides for Flash memory and any other type of module the company sells. Shop.Kingston.com also provides detailed Adobe Acrobat PDF-formatted installation guides from leading PC manufacturers.

Kingston's Jacobi says first-time memory buyers will have no trouble learning to install their upgrades.

"At Shop.Kingston.com," Kingston says, "we provide an animated installation guide that takes the anxiety out of the installation process for users at any level. It makes upgrading quick and easy."

Even if a customer has trouble with his upgrade, he can always call Kingston at 800-435-0640 and consult with a live Kingston memory expert, 24 x 7.

With its extensive support for first-time upgraders and 24-hour customer service, Kingston is bringing its memory products and high-level support to users of nearly every kind of mobile device or desktop PC. As a leading manufacturer, Kingston can provide upgrades for printers, iMacs, digital cameras, and the latest PDAs.

"Our size, reputation, and knowledge base," Jacobi says, "has helped make Shop.Kingston.com the de facto Internet Memory Center for all of the devices in your digital universe."

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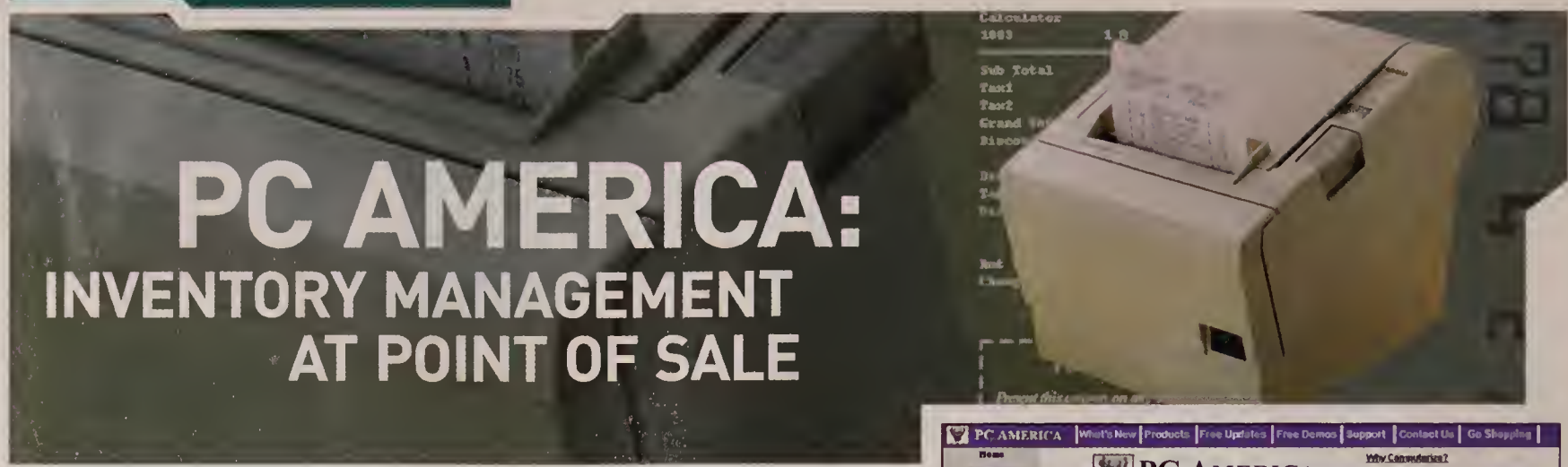

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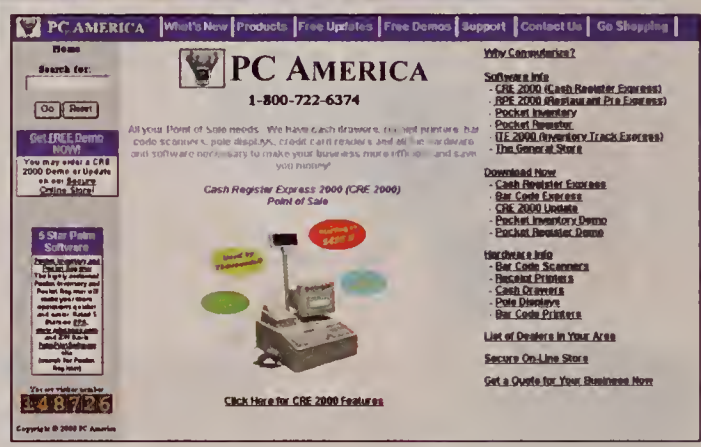


The home page for PC America speeds you to the point-of-sale products you need.

While many motorists in Dimondale, Mich. say the family-owned Windmill Truck Stop is a home away from home, its controller, Kevin Edelmann, says it's been more like a house of accounting horrors. Besides monitoring retail fuel sales in the truck stop's "truckers only" area, he also has to keep an eye on commuters' and travelers' purchases in the king-sized complex's convenience store, family restaurant, motel, and auto service center. "Keeping track of all of that inventory has been a nightmare," Edelmann says.

The Point of Sale (POS) system that the Windmill had been using since 1982 did a fine job of ringing up sales, but it couldn't tell store managers anything about what was on the shelf. "The system only broke sales down by department," Edelmann says. "So it couldn't tell the difference between a tube of toothpaste and a bottle of shampoo."

Edelmann found only a few POS solutions that were easy to use, Microsoft Windows-based, and able to support multiple input devices. And none of them could manage the 20,000-plus items in the Windmill's convenience store and restaurant. "We desperately needed a solution that could bring all of these components of our business together," he says.

PC AMERICA

Things finally turned around at the Windmill once Edelmann deployed PC America's Cash Register Express (CRE 2000), a Windows-based POS program that works with ordinary PCs and peripherals, as well as barcode scanners, receipt printers, and pole displays (which show charges at the checkout counter). Now all of the Windmill's cashiers can use touch screens and barcode scanners to enter orders and update inventory. And setting up CRE 2000 could not be easier, says Edelmann. "PC America did an excellent job pulling all of the hardware together initially. But the great thing about their software is that I can grab any component I want off the shelf and throw it together in no time. This is one slick program."

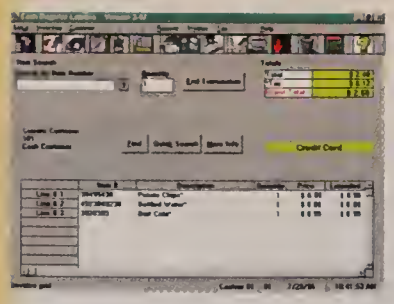
The Windmill has processed more than half a million transactions with CRE 2000 and PC America's Restaurant Pro Express (RPE 2000) since October 1999. And Edelmann predicts that PC America will continue to develop the software he needs to keep things running smoothly. "PC America is constantly improving upon their products," he says.

Now PC America is helping retailers like the Windmill to move beyond the sale itself to increase revenues. A new feature in CRE 2000 gives businesses the ability to print coupons on the bottom of sales receipts on an Epson TM-T88II receipt printer. They can use the coupons to advertise specials on slow business days (e.g., "10 Percent Off All Purchases Every Tuesday"), or to give their customers discounts on overstock items (e.g., "Get a Free Six-Pack of Pepsi on Your Next Visit").

CRE 2000's couponing feature promises retailers an excellent route to a crucial dimension in retail sales. "Repeat business is the most important aspect of any business," says PC America's president, Howard Gosman. "With this addition to our POS package, we are giving our customers a quick and easy-to-use method for creating it."

Cash Register Express Software
for Windows...$495

Computerize any type of retail store using Cash Register Express for Windows. Computerization pays for itself, saving you thousands of dollars, giving you peace of mind, and making the best use of your time. Cash Register Express



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More Software for Your Retail Store

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- Barcode Express
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- All Single or Multiuser

All PC America Software requires Microsoft Windows. The software was written in Visual Basic using Microsoft Access Files. The source code is available.

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SYSTEMS START AT $495.

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*All prices depend on make and model.

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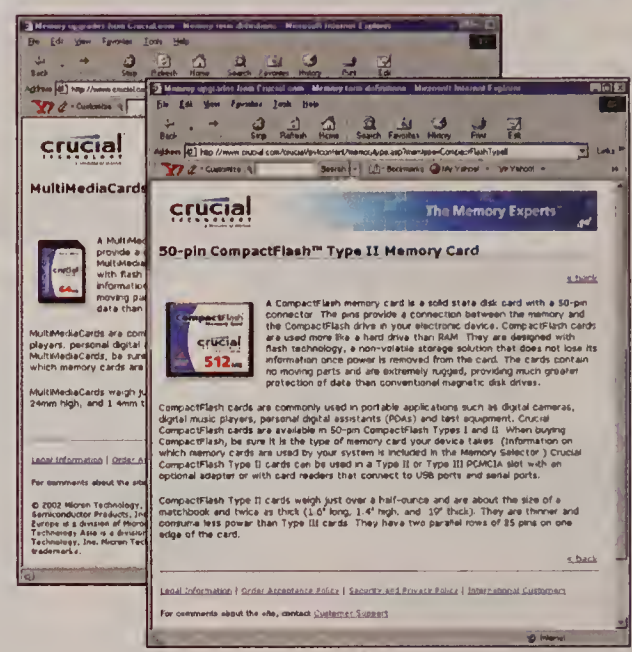

It was hard to believe, a year or two ago, that our $500-plus PDAs or digital cameras would ever need more memory. But as users adapt to their new filmless, wireless world, they're looking to add flash memory to their gadgets and productivity tools quickly, and without any hassle.

Few online vendors, however, are leading flash memory buyers to the exact memory cards they require. They often force their customers to sift through long and confusing lists of memory cards, sometimes from unnamed manufacturers.

Crucial.com is an exception. As a division of Micron, one of the world's leading memory manufacturers, Crucial.com's reputation for quality is now making it a go-to site for flash memory purchases. Crucial.com's search tools, articles about flash memory, and glossary of terms help make buying flash memory easy and affordable.

And Crucial recently expanded its flash memory line to include higher-density CompactFlash cards and a wide range of MultiMediaCards, which are commonly found in digital still and video cameras, PDAs, and cell phones.

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GUARANTEED COMPATIBILITY

Crucial.com guarantees the compatibility of every flash memory card purchased through the site's Memory Selector℠, an all-in-one search tool for finding exactly the right memory for a particular system.

With the Memory Selector, Crucial.com shoppers simply enter their electronic device's make and model (or other information), and the site returns a list of memory upgrades that are guaranteed to work with that system. Flash memory buyers can also search the site by standard memory type, such as "CompactFlash" or "MultiMediaCard."

And all of Crucial.com's memory products are mechanically and electronically compliant with stringent industry standards.

DESIGNED WITH THE CUSTOMER IN MIND

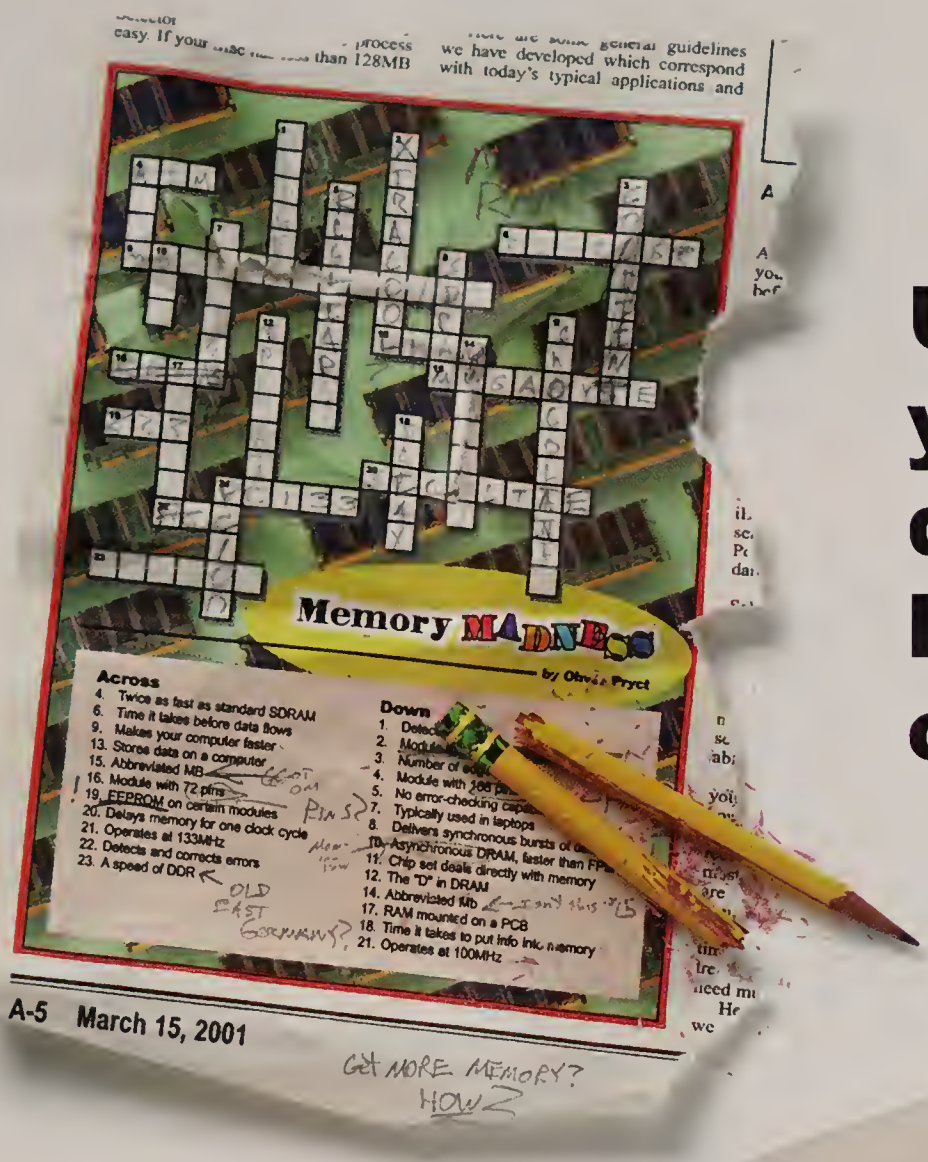
For shoppers unsure about using flash memory upgrades, or those who simply want to know more about how their devices work, Crucial.com has posted articles about flash memory upgrades and their benefits. The site also includes a glossary of terms for buyers of all types of memory.

"Our customers know they're getting the best flash memory available, at great prices," says Cynthia Gibson, product marketing manager at Crucial.com.

Crucial.com backs all of its flash memory with a five-year warranty and free technical support through its live-chat Expert Line, or via e-mail and a toll-free telephone number. Crucial.com also keeps its customers' personal data safe and secure. The site's Safe Shopping Guarantee promises shoppers that their transactions are encrypted and personal information kept completely confidential.

Crucial.com already sells over 94,000 memory upgrades for more than 15,000 computers, peripherals, and handheld devices. And the site, according to Crucial.com's Gibson, is expanding its flash memory offerings to meet its customers' growing demands.

"We became a leader in the memory upgrade market because our customers knew they could count on us for only the highest-quality memory," says Gibson. "But our customers also know that we will always grow our product line in order to meet all of their memory upgrade needs."



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Prices reflect an automatic 10% discount for ordering online. Prices may vary according to specific system requirements. The prices listed were valid on 7/2/02 when we sent this ad to the publisher; however, prices may have dramatically increased or decreased since then. Visit the FAQ section of Crucial.com to learn more about why memory prices go up and down.

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If you are like a lot of people considering the purchase of a snazzy new LCD monitor, you probably have several key criteria in mind. You want the monitor to be compact and super-slim for desktop space savings. You want it to be easy on the eyes, fair on the pocketbook, and stingy when it comes to energy consumption.

You have standards and criteria for the company behind the LCD monitor, too. You want the vendor to be a world-class company with a long history in the market, not some fly-by-night outfit. You want that company to treat customer service and product quality as its primary commandments. And you'd like to be able to make your purchase at any number of convenient outlets.

This prized combination of purchase criteria points in the direction of one single supplier—Sys Technology, Inc. (SYS International, Inc., dba Sys Technology, Inc.), www.syslcd.com. This Cypress, California-based manufacturer has been producing high-performance technology products since 1988, priding itself on quality, performance, customer service, and fair prices that are lower than those charged by the big-name vendors while matching those vendors step-for-step in quality and product integrity.

Moreover, Sys is in the midst of a major effort to become a national, brand-name company, having launched a national promotional campaign in the pages of *PC World* magazine. Spearheading this national effort is Denis Karpeles, senior vice president of sales and marketing at Sys.

With so much going for the company, it's small wonder that when the giant OfficeMax chain considered carrying the LCD displays of six different major monitor vendors, it settled on one winner: Sys Technology, Inc. Its LCD monitors will initially be carried in more than 300 OfficeMax stores around the country.

LCD buyers at OfficeMax will be greeted at the Sys display area with a special demonstration multimedia DVD, showcasing the Sys LCD monitors in stock and their diverse applications and features. The Sys LCDs can also be purchased through several other sources, including TigerDirect, J&R Music, PC Mall, PC Connection, Stereo Advantage, RCS, IBS, Nebraska Furniture Mart, and American TV.

The Sys LCDs are available in 15", 17", and 18" models. Specifications for the popular 17" active-matrix TFT SXGA model include 1280 x 1024 native resolution, .26mm dot pitch, a 120-degree viewing angle, support for 16.7 million colors, full-front-panel OSD controls, and internal speakers. These and other specifications of the full line of Sys LCD monitors meet or beat the specifications of the big-name vendors, but at consistently lower prices. All Sys LCD monitors come with a three-year labor guarantee and a one-year warranty on the panel.

So whether you're buying for a major corporation, government entity, or educational organization, or whether you're just a savvy end user who demands the very best for your money, it makes sense to explore the great LCD monitors from Sys Technology. After all, you stare at your monitor for hours each day. It's not polite to stare! Except at SYS.

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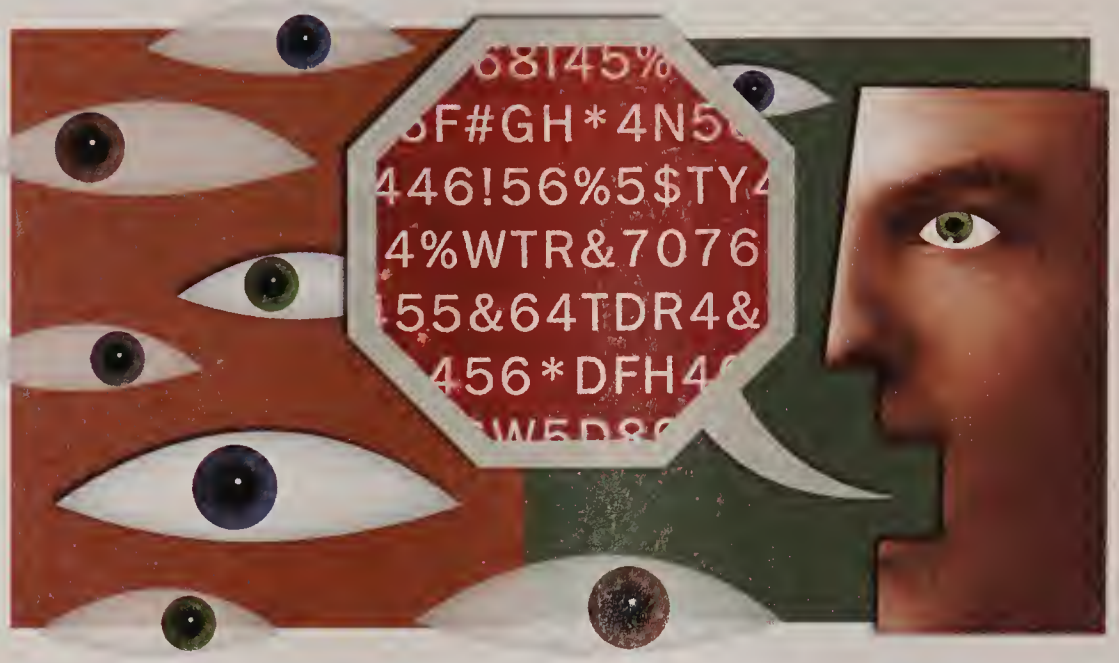
HERE'S HOW

EDITED BY MICHAEL S. LASKY AND DENNIS O'REILLY



WINDOWS TIPS

SCOTT DUNN

Keep Prying Eyes at Bay With Windows' Passwords

Windows XP

IT SEEMS NOT a week goes by without some panic over a virus or hack attack that exploits a new Windows security leak. We may not be able to rewrite Windows XP code, but we can make the OS a bit more secure. The first step in any security plan is to protect your system with a password. Here are the ABCs (and some XYZs) of password protection in Windows XP.

Make your password difficult to crack. You already know, of course, that you should never base your password on your name, your pet goldfish's name, or even your favorite aunt's name—unless she's affectionately known as Aunt Y#Ji7_Q. Other fundamental password-creation rules aren't so obvious, however. For example, Microsoft claims that the type of encryption Windows uses makes passwords that are either 7 or 14 characters long harder to crack than passwords of other lengths. In addition, the company recommends that you use a mix of alphabetic characters, numerals, and typewriter symbols in your passwords, and specifically that you include at least one symbol in the second through sixth characters.

Give yourself a clue. Windows XP lets you create a hint to jog your memory in case you forget your password. (Note that this option works only if your computer is not part of a network domain. To check, right-click *My Computer*, select *Properties*, click the *Computer Name* tab, and then look for an entry for 'Domain'.)

Open Control Panel and click or double-click *User Accounts*, depending on your setup. If you're an administrator, choose your account name. Click *Change my password* or *Create a password* (if you don't have one). Enter your existing password (if you have one), your new password, and your password hint. Even if you're just adding hint text, you still must enter the old password in the top boxes.

Make your hint clear enough to remind you but vague enough not to reveal your password (since anyone can view your hint). When you're finished, click either *Change Password* or *Create Password*. The next time you forget your password when logging on, click the ? button to the right of the password prompt to see your hint.

Prevent forgotten passwords. If hints don't do it for you, Windows offers an alternative. (If your PC is part of a network domain, skip to the second paragraph down.)

Open Control Panel and click or double-click *User Accounts*, depending on your setup. If you're an administrator, click your account name and look for a link on the left that reads *Prevent a forgotten password*. Select it to start the Forgotten Password Wizard, which enables you to create a "password reset" disk that lets you devise a new password.

If your computer is connected to a network domain, log off and then log back on to the local computer only (this tip applies to your Windows log-on pass-

ILLUSTRATION: JOYCE HESSELBERTH

158 WINDOWS TIPS
Get the upper hand on Windows' password options; organize your information using an index-card application.

162 INTERNET TIPS
Just say no to junk e-mail; log off an Outlook Express identity; find the free version of Real's media player.

164 STEP-BY-STEP
Ensure peak performance from your hard disk and other drives by optimizing your EIDE connection.

166 HARDWARE TIPS
Three options for old PCs; an easy way to find the cause of Windows error messages; muzzle your modem.

170 ANSWER LINE
Figure out which application will open a file that your system doesn't recognize automatically; put the shortcuts you prefer in Windows' Open and Save As dialog boxes; modify your Send To menu.

words, not to your domain passwords). Press **<Ctrl>-<Alt>-<Delete>** and then click *Change Password*. Finally, click *Backup* to launch the Forgotten Password Wizard.

The wizard warns you that you're making a disk anyone can use to change your password and log on to your account. Follow its prompts until you've clicked *Finish* and completed your password reset disk. Put the disk in a safe place.

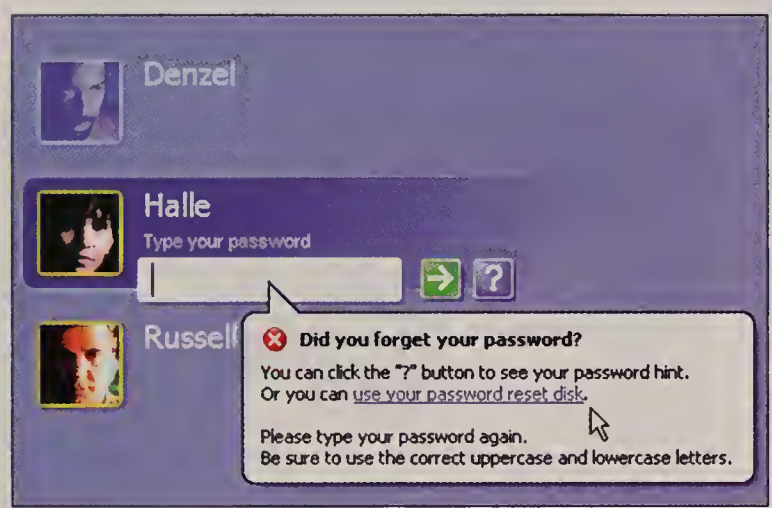


FIGURE 1: FORGOT YOUR PASSWORD? This won't be a problem after you've created a handy password reset disk.

The next time you forget your password, retrieve your reset disk and log on using a random, incorrect password. When you press **<Enter>**, a dialog box or pop-up balloon will appear, depending on whether you're connected to a network domain (see **FIGURE 1**). Click *Reset* or *Use your password reset disk* to start the Password Reset Wizard. Follow the wizard's prompts to create a new password and hint, if you want one. Then click your account again and type the new password. You can now return your reset disk to its hiding place. No need to create a new one: This disk will work fine no matter how many times you change your password.

Seek a higher power. Even if you forget your Windows log-on password and have no password reset disk, you may be not be entirely out of luck. If your PC has an administrator account, log on to Windows using that account and reset the forgotten password for the other account. Once again, open Control Panel and click or double-click *User Accounts*, depending on your setup. Select the forgetful person's account and click *Reset Password* or *Change Password* (depending on whether your PC is connected to a network domain). Enter the new password twice, as indicated in the dialog box, and click *OK*. (Note: The Reset Password button may be disabled for users who log on to a network domain; this tip works only for Windows log-ons, not domain passwords.) Resetting Windows' password can cause you to lose others, such as the passwords for Web sites and network connections, but at least you're not shut out of your account completely.

Salute before you log on. Setting your PC so that it requires you to press <Ctrl>-<Alt>-<Delete> before you log on to Windows protects your computer from Trojan horse programs, which can imitate log-on screens and trick you into revealing your user name and password. Using the "three-finger salute" ensures that you see the authentic Windows log-on screen. To enable this setting for a computer connected to a network domain, log on as the administrator, open the User Accounts Control Panel as described above, and click the *Advanced* tab. Under Secure Logon, check the option *Require users to press Ctrl+Alt+Delete*. Then click *OK*.

If your PC is not connected to a network domain, log on as an administrator and open User Accounts. Click *Change the way users log on or off*. Uncheck *Use the Welcome screen* and click *Apply Options*. Users will now have to type both their account name and their password after pressing <Ctrl>-<Alt>-<Delete>. They also lose the ability to do fast user switching, but the PC will be a bit more secure.

Use the keyboard to lock your system. Going for a cup of coffee? Lunch? A meeting? Play it safe and lock your PC so that you have to enter a password to use it again. If your system is connected to a domain, simply press **<Ctrl>-<Alt>-<Delete>** and click *Lock Computer*. You'll have to press **<Ctrl>-<Alt>-<Delete>** again and enter your password when you return. If you're not on a domain, press **<Windows>-L** to bring up the log-on screen without ▶

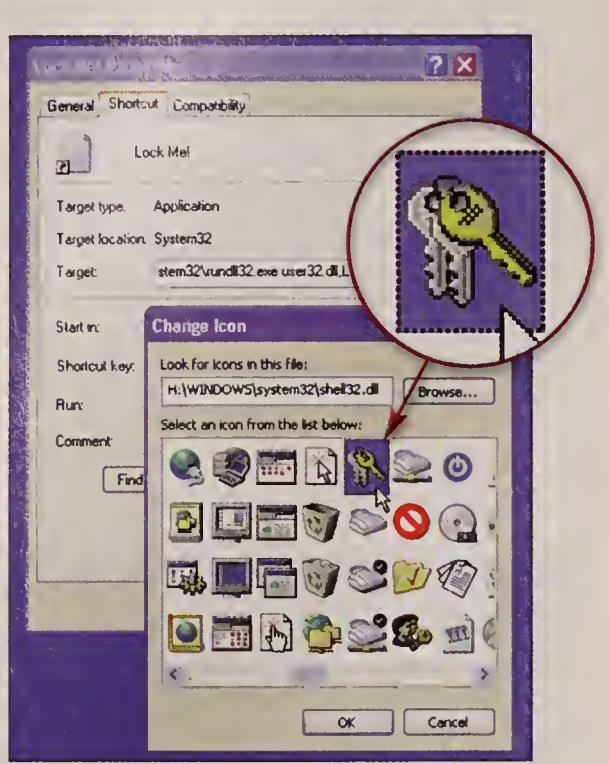


FIGURE 2: LOCK YOUR DESKTOP with just a click or two, using a customized shortcut.

closing any apps. When you come back, pick your account and enter the password.

Or lock your PC with a shortcut. If you're a mouse maven, you may want to lock your computer by double-clicking a desktop shortcut or by choosing one on your Start menu. To create a shortcut, open the folder you want to put it in, right-click inside the folder, and choose *New•Shortcut*. Type **rundll32.exe user32.dll,LockWorkStation** (include a space after '.exe') and click *Next*. Type a name for your shortcut and click *Finish*. If you don't like the shortcut's look, right-click the icon and choose *Properties*. On the Shortcut tab, click *Change Icon*; then click *Browse* and find a file with the icon of your choice. For example, you can select the Shell32.dll folder in Windows' System32 folder, click *Open*, and then choose one of the key icons in this file (see **FIGURE 2**). Click *OK* twice to assign the icon to the shortcut.

Set a backup lockdown. If you think you'll forget to lock your PC when you leave it, you can have your system automatically lock when the screen saver, standby, or hibernate features come on. These settings should be on by default, but it never hurts to check: Right-click the desktop and choose *Properties*. Click the *Screen Saver* tab and choose a screen saver from the drop-down list (if needed). Specify the wait time and check *On resume, display Welcome screen* or *On resume, password protect*. Now open Control Panel. If you're using Category View, click the *Performance and Maintenance* icon. Click or double-click *Power Options*. Click the *Advanced* tab and make sure *Prompt for password when computer resumes from standby* is checked. Click *OK*.

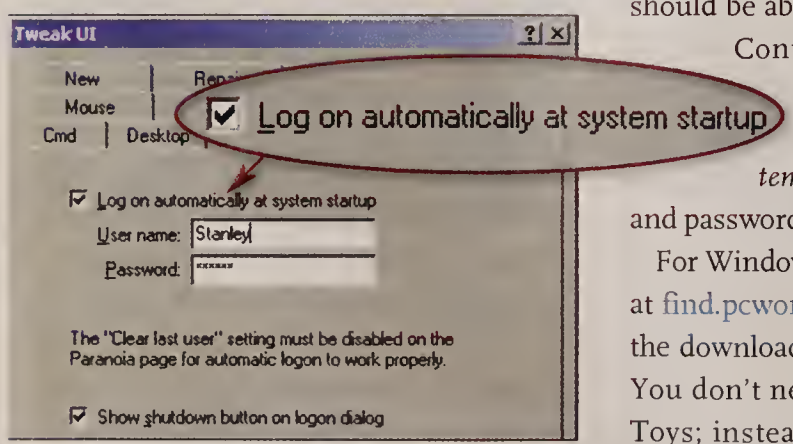


FIGURE 3: FEELING LUCKY? This setting in Tweak UI lets you skip password log-ons.

PASS ON PASSWORDS

I'M THE ONLY person who uses my home PC. I find it time-consuming and frustrating to sign in with a password each time I start my computer. How can I eliminate this security feature?

Norman Ernst, Hauser, Idaho

PASSWORDS AREN'T for everybody. Maybe your system isn't connected to any other PC (via the Internet or another method) and you're the sole user. Or you may have a lot of faith in your antivirus software and are unconcerned about privacy. Whatever the reason, you can skip the password prompt in all versions of Windows if you wish. In Windows 9*x* and Me, choose *Start•Settings•Control Panel* and double-click the *Passwords* icon. Under the Change Passwords tab, click *Change Windows Password*. Type your old password in the Old Password box (duh), and leave the remaining two boxes blank. Click *OK* and then *Close*. Now double-click the *Network* icon. Under the Configuration tab, make sure that Primary Network Logon is set to *Windows Logon*. Click *OK* and close Control Panel. Click *Yes* if prompted to restart your computer.

In Windows 2000 and XP, you need to download and install Microsoft's free Tweak UI program. For Windows 2000, download Tweak UI 1.33 at find.pcworld.com/29888. After double-clicking the download to extract the compressed files, right-click the *tweakui.inf* file (the icon looks like a notepad with a cog in front) and choose *Install*. After installation, you should be able to launch Tweak UI from Control Panel. Once it's open, click the *Logon* tab; check *Log on automatically at system startup*. Enter your name and password and click *OK* (see **FIGURE 3**).

For Windows XP, download PowerToys at find.pcworld.com/29889. Double-click the downloaded file to start the installer. You don't need to install all the PowerToys; instead, use the 'Custom setup' option to install only Tweak UI. Follow the setup wizard's instructions, and once the program is installed, choose *Start•All Programs•Powertoys for Windows XP•TweakUI for Windows XP*. In the left panel, double-click *Logon*, then click *Autologon*. In the right panel, check *Log on automatically at system startup*. Enter your name and domain (or current computer name), set your password, and click *OK*. ■

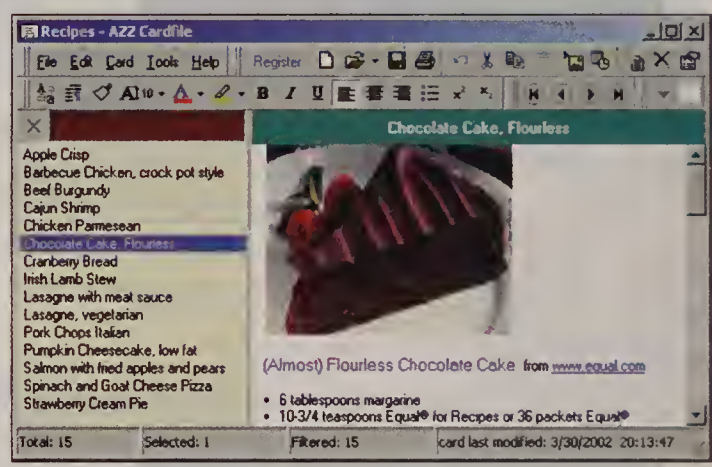
Send your Windows-related questions and tips to scott_dunn@pcworld.com. Windows Tips *pays $50 for published items. Scott Dunn is a contributing editor for* PC World.

WINDOWS TOOLBOX

Keep Tabs on Your Life With AZZ Cardfile

WAY BACK IN the days of Windows 3.1, Microsoft included a utility called Cardfile. It was much like a real file of index cards, handy for notes that kept track of friends, businesses, recipes—you name it. Cardfile is long gone, but thanks to Antanas Zdramys of Vilnius, Lithuania, you can have a much-improved version.

AZZ Cardfile makes it easy to add, edit, and remove cards and arrange information any way you want. It's a snap to add hyperlinks that launch a file, start your e-mail program, or open a Web page. Want to make a call? Just double-click a phone number and press <F5> to launch Cardfile's built-in dialer (or the Windows dialer, if you prefer). Office-like toolbar options make formatting just as simple. The program's search feature is likely to find a desired card before you even finish typing a keyword. Customizable toolbars round out the features. It's well worth the $12 registration. Go to find.pcworld.com/29765 to download your copy.



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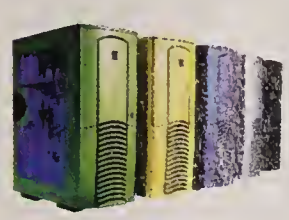

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INTERNET TIPS

SCOTT SPANBAUER

INSTANT CHAT FOR POWER TALKERS | INSTALL REALONE WITHOUT HASSLES | MULTIPLE IDs IN OUTLOOK EXPRESS

The Junk Mail Hater's Guide to Opting Out

IF A WEB SITE asks me whether I want to receive spam, and I say no, that means no. Earlier this year, Yahoo decided that even though many of its users had already opted out of its various e-mail marketing messages, it would nevertheless sign them up (see find.pcworld.com/29855).

I guess the company is within its rights. After all, Yahoo users don't have to pay for such services as Yahoo Messenger and Yahoo Mail. Fortunately, you can still opt out of receiving marketing messages from the company if you like. And while you're at it, you may want to review your personalization settings at other online sites and services to make sure your online privacy is protected and to keep your in-box free of clutter.

First, let's visit Yahoo. To review your personalization settings at the site, browse to my.yahoo.com, and sign in with your Yahoo ID and password (if you're not a Yahoo subscriber, you can sign up on the same page). Next, click the *Account Info* link that appears at the top of the page—you will be asked to enter your ID and password once again for security. Now you're looking at your Yahoo ID Card, which summarizes details that you've provided to Yahoo in the past, including your zip code, gender, occupation, and even your address and phone number.

To alter any of these items, click the small *Edit* button at the top of each ID Card section, and delete or change the information listed there.

Next, click the *Edit your marketing preferences* link in the center of the ID Card. If you haven't visited the site for a few months, it may look like mine (see **FIGURE 1**). Yahoo automatically signed me up for every category of its special offers and marketing communications. Click the *No* button next to those offers you don't want to receive. If you've supplied your street address or telephone number (you might want to think twice about that), scroll to the bottom of the page and check *Do not contact me via postal address* and the similar telephone option, unless you want to receive even more junk mail and telephone solicitations than you already do. For the Yahoo Delivers service, you can either deselect the service completely by clicking its *No* button, or leave it enabled and click its *Edit your preferences* link to select the product categories you do want to hear about. Click the *Save Changes* button at the bottom of the page in order to make the settings permanent—we hope.

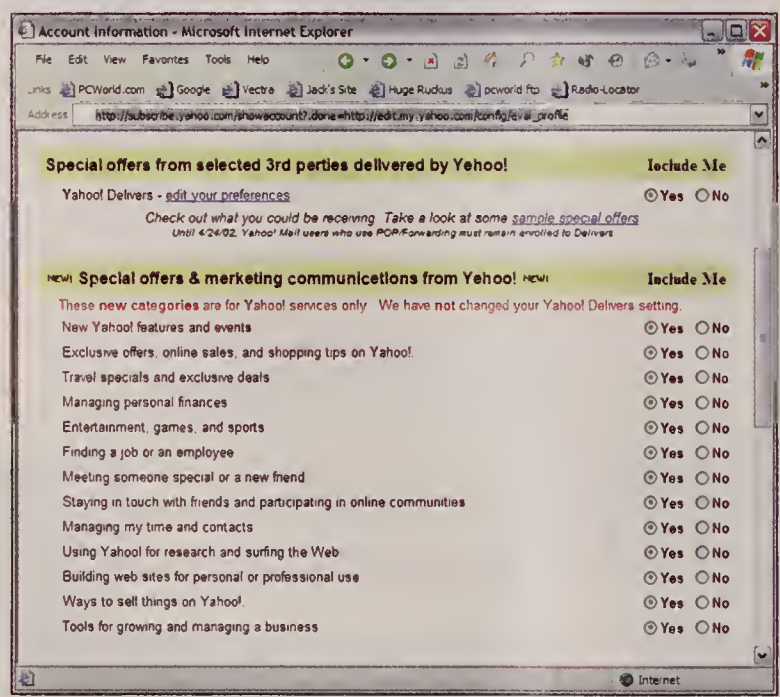
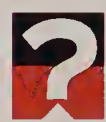


FIGURE 1: CHECK YOUR YAHOO preferences, and deselect as needed to stop unwanted e-mail, junk mail, and phone calls.

Other sites let you control your preferences and opt out of junk mailings in similar ways. For Microsoft services such as Hotmail and MSN Messenger, visit www.passport.com and click the *Edit the information in your .NET Passport* link. America Online offers two important personalization links: Go to keyword **preferences**, and click the *Privacy* and *Marketing* links there. If you receive the *New York Times'* free daily e-mail version (highly recommended), visit www.nytimes.com/membercenter to control personal information and the delivery and marketing options. Even PCWorld.com offers the same kind of controls for those who use its optional Member Services. Just scroll down to the bottom of the page, click the *Member Services* link, and log in.

OE: LOG OUT, DON'T JUST EXIT



IN THE FEBRUARY issue, *PC World* gave Microsoft's Outlook Express 6 the Best Bet rating among e-mail clients ["Browsing and Beyond," find.pcworld.com/26222]. However, I could not find any

R.I.P. FOR DOMAIN NAME BUYERS GUIDE

THE DOMAIN NAME registrar review site that I recommended in February's column, DomainNameBuyersGuide.com, is apparently no longer master of its own domain (name). The URL now takes you to a commercial site offering domain name registration. Until a review site similar to the original appears, you'll have to settle for The Internet Corporation for Assigned Names and Numbers' simple accredited registrar list (head to find.pcworld.com/28801).

way to log off my identity after a given session—so when I close OE, anyone could open the program again and read all the e-mail in that account. Is there a better way to log off an identity than restarting Windows?

Anand Narayan, via the Internet

THERE ARE MANY reasons why I think Outlook Express is a good e-mail program, and an important one is its unique ability not only to manage multiple e-mail accounts, but also to allow multiple users (families, for example) to maintain individual, private in-boxes and address lists. The feature you are looking for is there, though it's easy to miss.

To log off an Outlook Express identity, choose *File•Exit and Log Off Identity.* You can also log off by selecting *File•Switch Identities* and clicking the *Log Off Identity* button (see **FIGURE 2**).

But don't allow your paranoia to subside completely. The strength of Outlook Express's log-on security depends greatly on which version of Windows you use, and on how your version of Windows is configured. If you're using Windows 95, 98, or Me, it's a trivial matter for knowledgeable snoops to view your in-box. So if you want to protect your e-mail and other files from the prying eyes of coworkers, curious teenagers, or the office janitor, you need the stronger log-on security, encryption, and file access controls that are offered by Windows XP Professional and Windows 2000 Professional.

FIGURE 2: LOG OFF Outlook Express to keep your e-mail in-box and address book private.

HOW TO DEAL WITH 'REAL'

WHEN I PICKED RealNetworks' RealOne as my favorite media player in February's "Browsing and Beyond" story, several readers expressed shock that I recommended a program that charges by the month for downloads, takes over playing every kind of media file on your PC, and tries to install adware in the bargain. I still like RealOne and recommend it to you. But you don't have to pay a dime for it, and you can use it without giving up control of your PC to RealNetworks.

When you visit Real's Web site at www.real.com, avoid all the large Download Now links and instead click the little blue *Our Free Player* link that's located midway down the page. Subsequent screens will try to lure you into one-month trial subscriptions and other attempts to separate you from your cash.

Just keep clicking the links that lead to the free browser. After you give the company an e-mail address (it doesn't have to be yours), the downloading begins.

Real will first try to install the RealDownload Express 5 utility, an app that tracks the download process and forwards the information to RealNetworks. Just click *No* in the security dialog box that pops up asking you to allow the RealDownload installation.

If the download process fails, you can find the tiny, tiny link on the download page that says 'click here'. Congratulations! You have managed the nearly impossible task of downloading the free RealOne Player Gold.

Now for taming RealOne's hunger for your media file associations. When you launch the installation file, RealOne gives you the choice of Express or Custom installs. If you choose Express, RealOne will make itself the king of all media on your PC—so choose Custom instead.

During installation, RealOne will ask you to approve a long checklist of file types it knows how to play. Be sure to remove the check mark from file types that you want to continue playing on another program on your system, such as Windows Media Player or Winamp, and then finish the installation.

If you assign RealOne a file type that already belongs to another program, or if you install another program and tell it to take control of one of RealOne's file types, RealOne will eventually pop up a dialog box telling you that it's reasserting its claim (most media players and Web browsers do the same thing, but just don't post an announcement).

To get everybody cooperating, open RealOne's Preferences dialog box by choosing *Tools•Preferences* from RealOne Player's menu bar, select *Media Types,* check only those types you want RealOne to play, and click *OK.* Finally, look for a similar settings screen in your other media players and deselect the file types you assigned to the RealOne Player. ■

Send your questions and tips to nettips@spanbauer.com. We pay $50 for published items. Scott Spanbauer is a PC World contributing editor.

DOWNLOAD OF THE MONTH

MIRC 6.01

CHAT, CHAT, CHAT. There are many kinds of chat. Internet Relay Chat is what got it all started back when the Internet was still an inside secret. IRC remains an important tool because it is uncensored, private, and not subject to any corporation's terms of service. Though there are many ways of plugging in to IRC, one of the best for Windows users is MIRC's $20 MIRC 6.01. The free 30-day evaluation version is a 1.1MB download from find.pcworld.com/27062.

Unlike AOL's, Microsoft's, and Yahoo's instant messaging systems, IRC consists of multiple networks of independent chat servers, each hosting multiple chat channels. Using a few basic commands, you join or exit existing channels, create your own channel, find out more about other users on the channel and send them private messages, and even decide who can and can't join your channel. In other words, getting started can be a bit daunting. Though MIRC's online help file is an excellent introduction to using IRC, you'll find even more guidance at www.irchelp.org. Now start talking.

STEP BY STEP

STAN MIASTKOWSKI

Get Maximum Speed From Your New Drives

IT'S A BUYER'S market for drives. Low prices for fast CD-RW drives, cutting-edge rewritable-DVD drives, and the most recent generation of high-capacity hard drives make it a perfect time to upgrade. But unless you do some installation planning, you may be disappointed with the performance of your new peripherals. Your new CD-RW drive might create coasters instead of finished discs, and in some cases your PC could slow down.

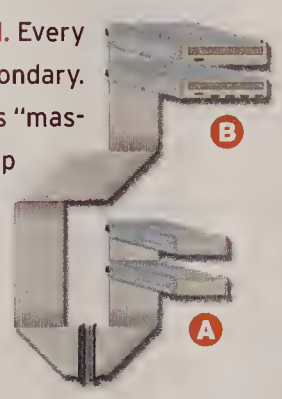
But that doesn't mean you should be reluctant to upgrade. Just follow the tips presented below to make sure that your new peripherals will be on friendly terms with your PC's existing drives.

For more of the nitty-gritty details of installing drives, see "Install a Bigger, Faster Hard Drive" in the June 2001 issue (find.pcworld.com/29879) and "Manage Your Drive Connections" in the November 2000 issue (find.pcworld.com/29880).

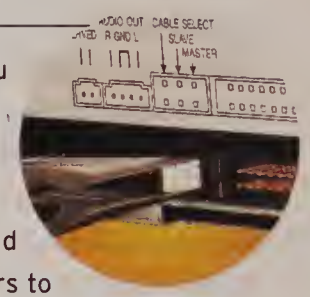
And as always, do a complete backup before you start your upgrade project. ■

Stan Miastkowski is a contributing editor at PC World. Address your questions to him at stan_miastkowski@pcworld.com.

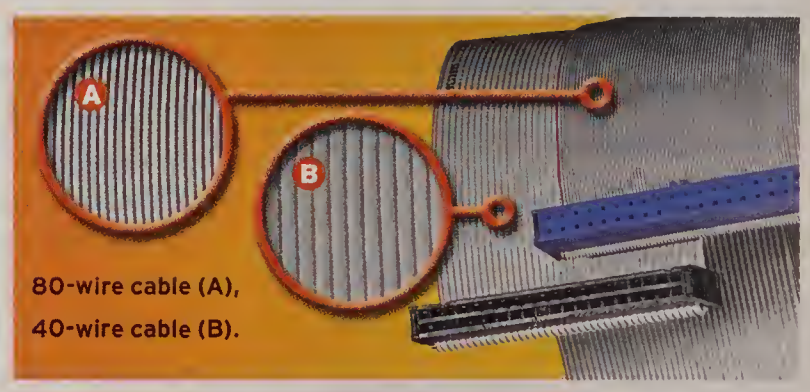
1 Keep hard drives on their own EIDE channel. Every PC has two EIDE channels, primary and secondary. Each channel can handle two drives, designated as "master" and "slave." For the best performance, keep hard drives on the primary channel (A) and other drives on the secondary channel (B). If possible, you should avoid installing a hard drive on the same channel with a slower optical drive, because this can limit the hard drive's performance.



2 Set slower drives as slaves. You should always configure the faster drive on an EIDE channel as the master, and the slower as the slave. For example, if you have both a 5400-rpm hard drive and a 7200-rpm drive, set the latter's jumpers to make it the master. If you're running a CD-RW or rewritable-DVD drive on a secondary channel with a read-only optical drive, make the rewritable drive the master to ensure reliable disc creation.

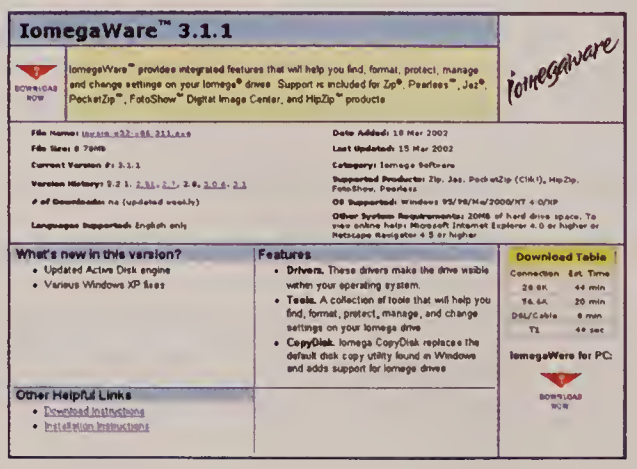


3 Use the correct cables. Today's hard drives require 80-wire data cables to achieve maximum performance. CD-RW drives, rewritable-DVD drives, and other EIDE devices (Zip drives or tape backup units, for example) use 40-wire cables. But the connectors on both types of cables, as well as the connectors on the motherboard, are identical. Make sure you don't use the wrong type of cable with your PC's hard drives. Using an 80-wire cable with CD or DVD drives is fine, although it won't improve their performance. And you must use an 80-wire cable if you mix a fast hard drive with a slower device on the same channel.



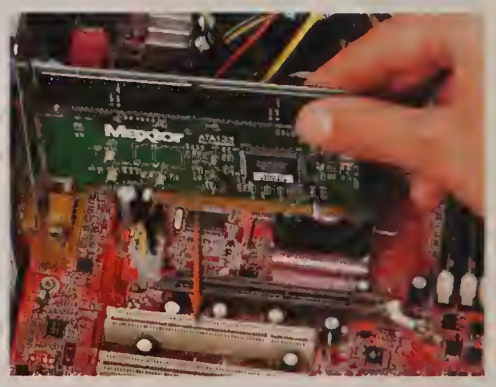
80-wire cable (A), 40-wire cable (B).

4 Use the latest software. For hard drives, use the included installation software to make sure that the entire capacity is available. That's particularly important if your PC is more than two or three years old. Check the support section of your PC maker's Web site for an updated BIOS.



Rewritable-DVD drives and other EIDE devices such as Zip drives require specific drivers. Even if you recently purchased the drive, check the maker's Web site for the latest driver update.

5 Install an add-in high-speed controller. Most new hard drives use the Ultra DMA/133 interface (aka ATA/133). Such drives will work on any PC EIDE interface, but only PCs manufactured in the last six months or so have built-in Ultra DMA/133 support. Most older PCs use Ultra DMA/100 or Ultra DMA/66 interfaces, and a slow interface can reduce your drive's speed.



To wring the maximum speed from an Ultra DMA/133 drive, consider installing an Ultra DMA/133 add-in board (about $50) from a vendor like Promise Technology (www.promise.com).

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HARDWARE TIPS

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REUSE, RECYCLE OLD HARDWARE | DEDUCE THE CAUSE OF PC PROBLEMS | TAME YOUR MODEM'S ROAR

What Should You Do With Your Old Computer?

IF YOU USE THE WISE advice in this month's Buyers' Guide issue to find your perfect PC, you may wonder what to do with your old system. You can't trade it in, and selling it may be more of a hassle than it's worth. If you throw it away, you may actually have to *pay* someone to take it. Is a three- or four-year-old PC really worthless? Not at all! Here are some ways to extend an old PC's usefulness.

WHY NOT KEEP IT?

A SMOOTH TRANSITION to a new system isn't guaranteed. A corollary to Murphy's Law states that the day after you delete a file, throw out a software manual, or give away an old computer is the day you desperately need it. Your old system may not be suited to high-speed graphics or fast-paced games, but if it's sporting a Pentium II CPU or better, it's probably more than adequate for word processing, Web browsing, and other basic tasks. New home networking products make sharing a high-speed Internet link cheaper and easier than ever. Check out find.pcworld.com/29750 for more on home networks.

If your old computer is too slow, consider adding more RAM. Upgrading your PC's memory is easy and still relatively cheap (though not as cheap as it was a few months ago). It's often an effective performance booster, especially if your old PC has less than 128MB of RAM. Point your browser to find.pcworld.com/29751 for more on memory upgrades.

Another way to breathe new life into an old system is to reinstall Windows and your applications. Over time, Windows accumulates bugs and glitches that slow performance. After the reinstall, be sure to download all patches available for your OS from Microsoft's Windows Update site at windowsupdate.microsoft.com.

If your PC *has* to go, consider donating it to a charity that accepts computers. To find a local one, search the PEP National Directory of Computer Recycling Programs at find.pcworld.com/29753.

Here are a few donating tips:

Make sure your PC is wanted. Any system with a Pentium processor or better should be suitable for donation. Call first, however, to find out if any restrictions or rules apply—and be sure to ask about delivery instructions, parking, pickups, and so on.

Include everything. Package the keyboard, mouse, manuals, and software disks with the PC. A total system is easier to process and much more useful than a partial one.

Clean it up. Giving your PC's exterior a quick wipe-down is a welcome courtesy. Also, remove all your personal files. You can do this with a program such as Norton SystemWorks 2002, or you can simply reformat the hard disk. If you reformat, be sure to reinstall the operating system. Otherwise the organization may have to pay for a new license.

Get it in writing. For tax purposes, get a receipt from the organization to confirm your donation. Make sure it has the date, the make and model number of your PC, and the make and model number of all other equipment you donate. The IRS allows you to deduct the fair market value of your PC, not the replacement cost or the purchase price. See Publication 526, Charitable Contributions, on the IRS Web site at find.pcworld.com/29756.

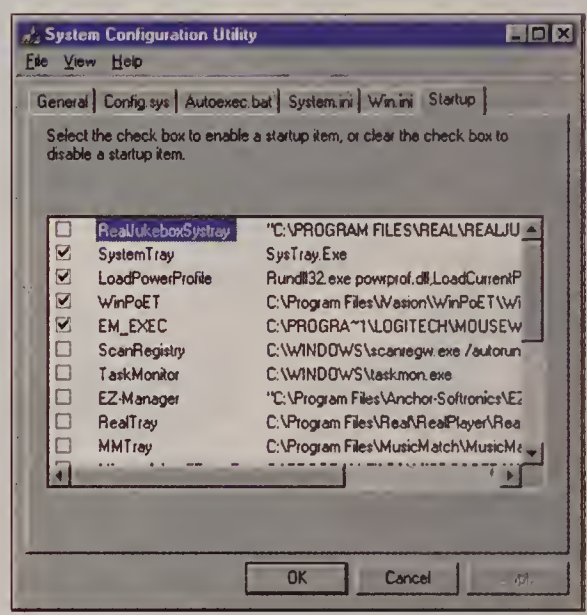

FIGURE 1: THE SYSTEM CONFIGURATION Utility lets you choose autostart programs.

A GREEN MACHINE

IF NO ONE WANTS your old PC and monitor, don't just throw them away. A monitor contains as much as 8 pounds of poisonous lead, and PCs also have small amounts of mercury, lead, and cadmium.

Do yourself and every other living thing on the planet a favor: Take your worn-out computer equipment to a certified recycler. Hewlett-Packard and IBM have recycling programs, as do some Best Buy locations. To find a recycler near you, visit find.pcworld.com/29759 to see the Environmental Health Center's list of electronic equipment recyclers. Recycling ▶

WHAT'S IN A NAME?

EVERYTHING, if you've got an unmarked modem, graphics card, or other piece of hardware and you need to find a driver to run it. Most hardware manufacturers have the drivers for old hardware available for download, but you have to know what you're looking for. Fortunately, you may be able to unmask your nameless hardware via its FCC identification number, which is printed on many different types of devices. Head to find.pcworld.com/29763 to look up your mystery metal in the FCC identification database.

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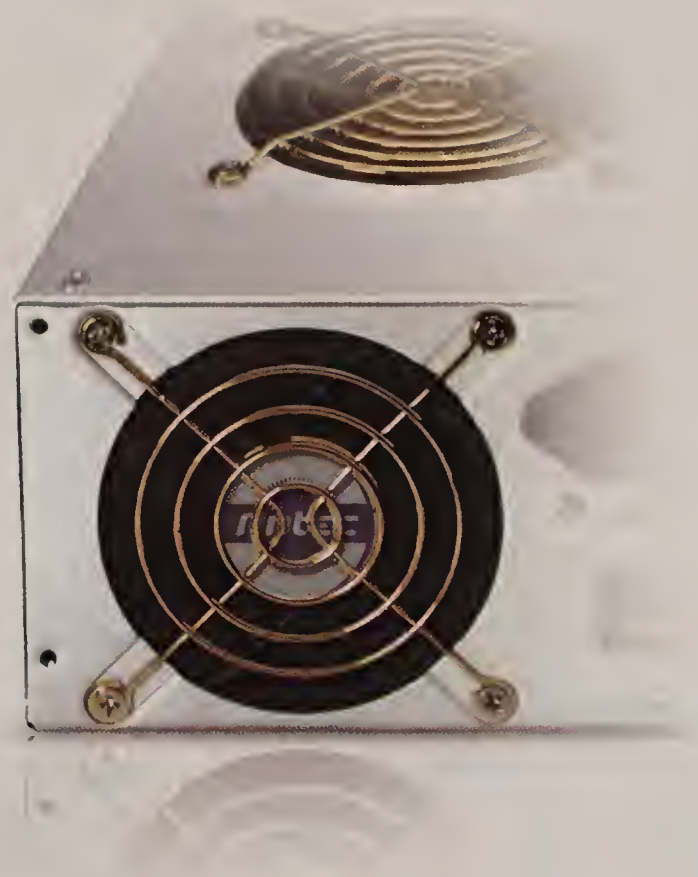

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old equipment may require a small fee, but when you consider the environmental damage you'll avoid, it's a bargain.

Before you cart your old PC off to the glue factory, defray your costs with a little beneficial cannibalism. Several PC components are easy to remove, and they may come in handy in the future.

Why not install your old hard drive in your new system? It's the easiest way to transfer your old files and folders to a new computer. (Migration software packages can do the same thing without having to open the PC's case, but they're a bit pricey for a single move. Note that Windows XP can handle many migration tasks itself.) Your old hard drive can also serve as a very fast backup platform. Head over to find.pcworld.com/29760 for step-by-step instructions on installing and removing a hard drive.

Hang on to your old computer's graphics card—if it has one. (Many budget systems put their graphics chips on the motherboard.) In a pinch, a spare graphics card can be a lifesaver. And as we describe at find.pcworld.com/29762, a second card may allow you to connect two monitors to your new machine.

You may want to retain your old system's modem as well. If you use DSL, cable, or another high-speed Internet connection and your new system doesn't have an analog modem, installing one to serve as a backup in case your high-speed service goes down could be invaluable.

Such spare components as network interface cards, sound cards, floppy drives, and CD-ROM drives are less likely to be useful for the casual or the very busy PC user, but holding on to these components can save you some money if you ever decide to build your own computer.

PLAY PC DETECTIVE

I UPGRADED my system with new components, new software programs, and more RAM. Now I get error messages when Windows launches and see all kinds of quirky behavior when programs run. One of my new additions must be the cause, but which? How can I isolate the problem without uninstalling everything?

Ian Moore, Billings, Montana

A HANDY TOOL called System Configuration Utility simplifies identifying buggy or incompatible hardware drivers and software. In Windows 98, Me, and XP, click *Start•Run* and enter **msconfig** to open the program. The Startup tab lists programs that launch automatically when Windows loads (see **FIGURE 1**). Unchecking one keeps it from doing so.

To find the source of your problems, start by disabling all the programs that automatically launch at Windows' startup. Under the General tab, uncheck *Load startup group items* or *Load Startup Items* (see **FIGURE 2**), depending on your version of Windows. Reboot your system, and if the problems end, then you know one of these programs is the culprit.

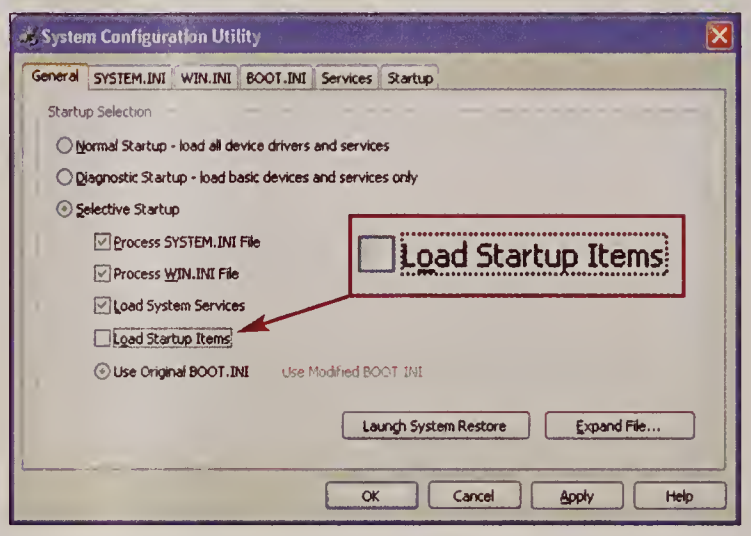
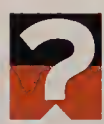


FIGURE 2: UNCHECK 'LOAD STARTUP ITEMS' to disable all programs that start automatically when Windows loads.

To isolate the offender, recheck your *Load startup* option. Restart, reopen System Configuration Utility, click the *Startup* tab, and enable one program at a time by checking the box next to its name. Reboot after re-enabling each program; when the problem starts to recur, you've found the source of your conflict.

If this process of elimination doesn't work, follow the same steps with the listings under the System.ini and Win.ini tabs. These settings are holdovers from the dark, antiquated days of Windows 3.1. They're rarely used now, but some old hardware and software may affect these settings. And if they do, they're prime candidates as troublemakers.

MUZZLE YOUR MODEM



SOMETIMES I HAVE trouble sleeping and go online in the middle of the night. When my modem logs on, the screeching sound wakes up everyone in the house, especially my dog. Is there any way I can get my modem to shut up?

Peter Hall, San Diego

JUDGING FROM the many e-mail messages I get on this subject, lots of people—and dogs!—are being slowly driven crazy by the nerve-jangling mating call of analog modems. Fortunately, there's an easy way to silence most of them.

Many modems let you set the volume level. In Windows 98 and Windows Me, open Control Panel and double-click the *Modem* icon. Click the *Properties* button and select the *General* tab. You may see a sliding bar that adjusts your modem's volume. If you use Windows XP, open Control Panel's Classic View, click or double-click *Phone and Modem Options* (depending on your system), choose the *Modem* tab, make sure your modem is selected, and click *Properties*.

If your modem properties lack volume controls, set Windows to enter the AT command string that silences your modem automatically each time it connects. (The AT command set is the de facto standard for controlling modems.) To do so in Windows 98 and Me, open your modem properties as described above and choose the *Connection* tab. Now select the *Advanced* button, and in the 'Extra settings' text box, type **atm0** (that's a zero, not the letter 'O'). In Windows XP, click the *Advanced* tab in your modem properties and type **atm0** in the text box under 'Extra initialization commands'. ■

Send your hardware-related questions and tips to kirk_steers@pcworld.com. We pay $50 for published items. Kirk Steers is a PC World *contributing editor.*

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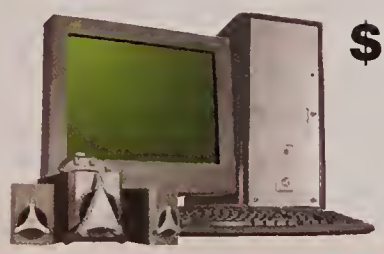

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What Apps Should I Use to Open Mystery Files?

I USE Microsoft Works. When I send a spreadsheet or word processing file via e-mail, the recipients sometimes complain that they are unable to open the attached file. What should I do?

Sonia Delmundo, Brooklyn

I'LL ANSWER YOUR specific question first, and then I'll address the general issue of dealing with file formats your system doesn't automatically support.

The best way to share files created in Works is to save the files in a non-Works format. Current versions of Works come with Microsoft Word, the most popular word processor used today. If you use Word rather than the Works word processor, your documents will have the standard .doc extension by default, and just about everyone will be able to read them.

Take care not to send out files in the program's default .wps format, which few other programs support. Before you send a file, select *File•Save As*, and in the Save As dialog box's 'Save as type' pull-down menu, select *Rich Text Format (*.rtf)*. Save the file, and then e-mail the RTF version.

The drill is pretty much the same with anything you create in the Works spreadsheet program. In the 'Save as type' pull-down menu, select *Excel 97-2000*.

But how do you open an e-mail attachment that's in a file format your system can't handle automatically?

First, make an educated guess about the kind of file you're dealing with. If the e-mail message refers to a letter or résumé, the attachment is likely from a word processor. If it refers to a budget, chances are that the attachment is a spreadsheet. Launch the appropriate program and drag the file into it, but drop it on the menus at the top of the app's screen, not the blank work area. If it loads, you guessed right and your PC supports those types of files.

If you have trouble with odd file types, you may need to get a file-viewing program. Ontrack's $30 PowerDesk Pro 5 shows contents of files created in many formats, and it lets you copy data out of the files and paste them into one of your own programs. You'll find the program at www.ontrack.com/powerdesk.

BETTER 'SEND TO' ACCESS

IN JULY, I DESCRIBED how to add items to the Send To menu (see find.pcworld.com/29891). Bruce Bevitz of Longwood, Florida, suggests an easier way to accomplish this in Windows 98, Me, and XP (but not in Windows 2000). Select *Start•Run*, type **sendto**, and press **<Enter>**. This opens your Send To folder. After you add shortcuts to this folder, they will appear whenever you right-click a file and select *Send To*. Conversely, removing an item jettisons it from the Send To menu.

CUSTOMIZE DIALOG BOXES

CAN I CUSTOMIZE the Places Bar in Internet Explorer 6's Save As dialog box so the icons point to my favorites rather than to Microsoft's?

James L. McCrystal, Jr., Cleveland

THE PLACES BAR is a column of shortcut icons located on the left side of Windows' standard File Open and File Save dialog boxes. The easiest way to customize it is by using Microsoft's Tweak UI freeware. There are separate versions of Tweak UI for Windows XP and for every other version of Windows; the XP version is part of PowerToys for Windows XP. Download the version for your OS at find.pcworld.com/29948 (scroll down as needed).

Windows XP: After you download and install PowerToys for Windows XP, select *Start•All Programs•Powertoys for Windows XP•Tweak UI for Windows XP*. In the left pane, click *Common Dialogs*. For further instructions, skip to "All versions" below.

All other Windows versions: Once you've successfully downloaded and installed Tweak UI, select *Start•Settings•Control Panel*, and double-click *Tweak UI* (in Windows Me, you may have to click *view all Control Panel options* first). If you find that your Tweak UI dialog box doesn't include three rows of tabs, upgrade to the current version. Click the *Open* tab.

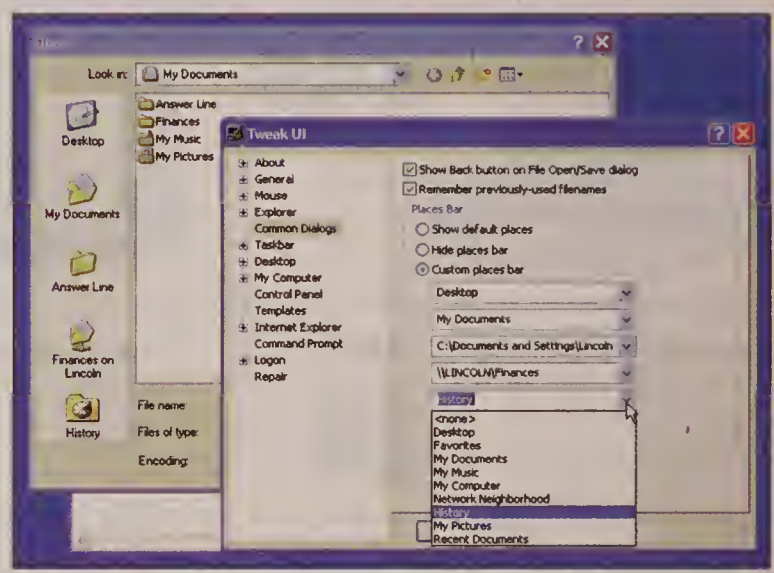

FIGURE 1: CUSTOMIZE THE PLACES BAR in Windows' dialog boxes by using this option in Microsoft's Tweak UI freeware.

All versions: Click the *Custom places bar* radio button. Below that, you'll find five pull-down menus representing the five Places icons. You can change any icon by selecting a different folder from the pull-down menu or by typing the full path to a different folder (see **FIGURE 1**). ■

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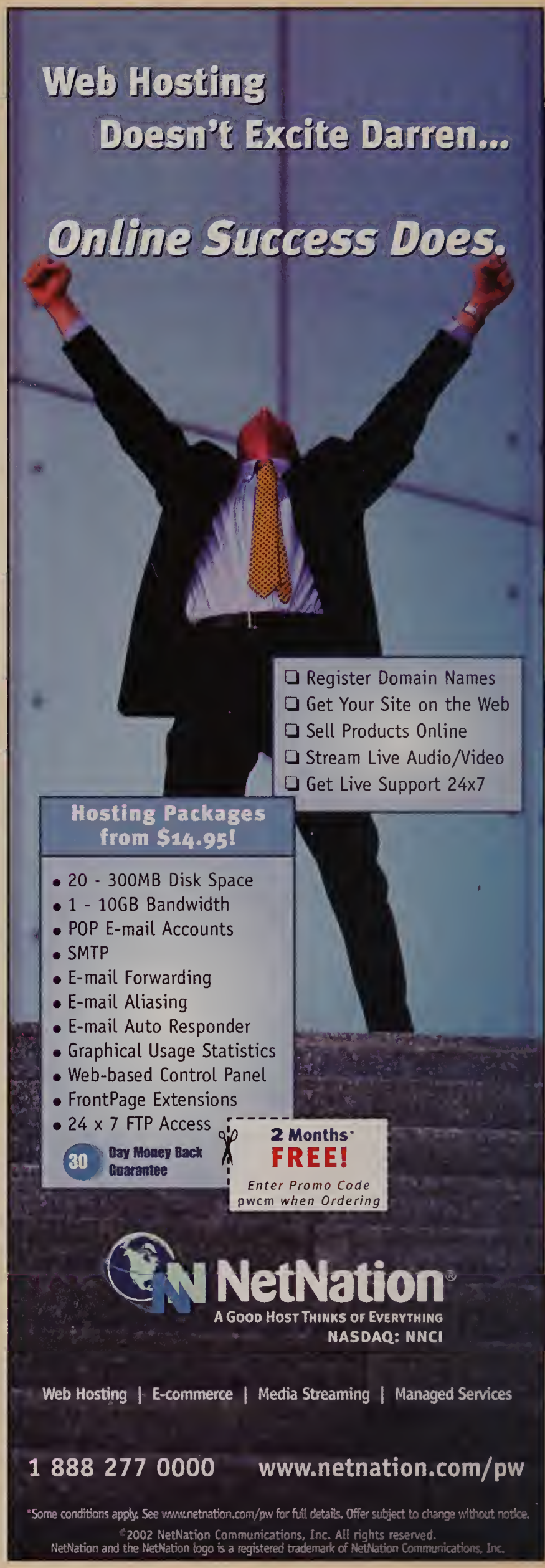

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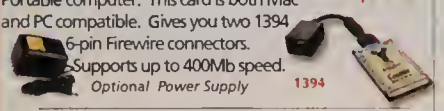

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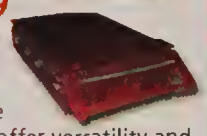

FireVue™ FireWire Hot-Swap Case Kits offer versatility and low cost transportable data storage. You simply buy the kit and as many extra bays to hold all the storage you need. Perfect for video production jobs, just dedicate a drive and bay for every job. With the low cost of IDE storage this system is one of the most cost effective "on-line" storage systems available.

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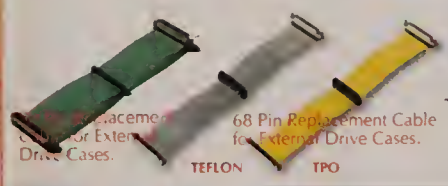

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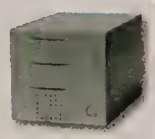

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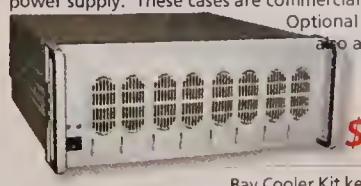

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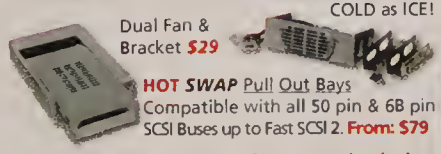

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Optional Remote Display

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Features:
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- Fast 50 & Fast Wide 68
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- Gold Contacts

Hot Swap Powered Terminator

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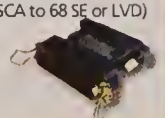
Ultra-320



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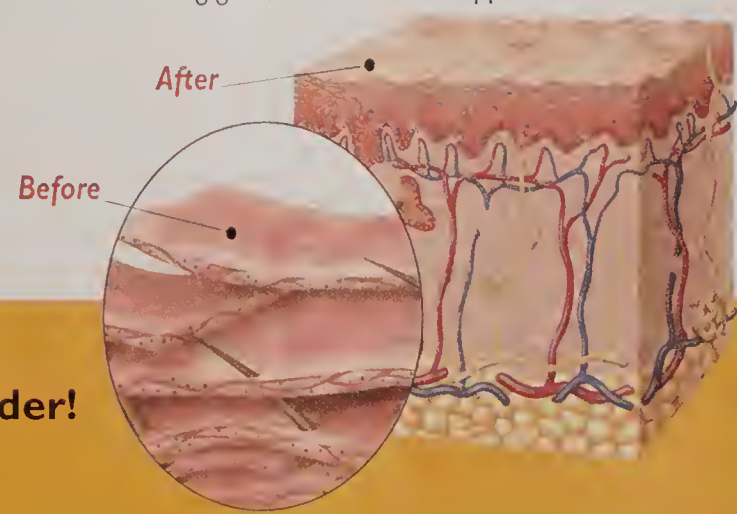

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ABS Computer Technologies, Inc.	www.abspc.com	161
Alienware	alienware.com	67
Antec Inc.	www.antec-inc.com	167
Anthro Corporation	www.anthro.com	43
APC	http://promo.apcc.com	73
AT&T Wireless	www.attwireless.com	15
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Compaq SMB	www.compaq.com	38-39
ComputerGeeks.com	www.computergeeks.com	82
Corel	www.corel.com	6-7
Cox Business Services	www.coxbusinessservices.com	48
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Creo, Inc.	www.creo.com/sixdegrees	137
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Freeway Technology Inc.	Freewaytech.com	169
Fujitsu PC Corporation	www.fujitsupc.com	16-17
Gateway	gateway.com	75-78
Gateway	gateway.com	110-111
Hewlett Packard	www.hp.com	40
Hewlett Packard	www.hpshopping.com	65, 83
Hungry Minds	www.dummies.com	86
IBM Direct	ibm.com/smallbusiness7055	124-127
JMTek, LLC	www.USBDRIVE.com	171
JungSoftUSA, Inc.	www.jsoftusa.com	95
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microexchange.com	microexchange.com	14, 189
MINOLTA-QMS	www.minolta-qms.com	45
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PC World & Network World Event	www.networkworld.com/events/SMB	87
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Samsung Electronics America Inc.	www.samsungusa.com/monitor	54-55
Seiko Instruments	www.seikosmart.com	117
Sharp Electronics	www.sharpusa.com	20-21
Sony Electronics	www.sony.com/projectors	115
Sprint Spectrum	www.sprintpcs.com	99A-99B
Sys International, Inc.	http://www.syslcd.com	157
Systemax	www.systemax.com	58
Toshiba America	www.toshiba.com	101, 103
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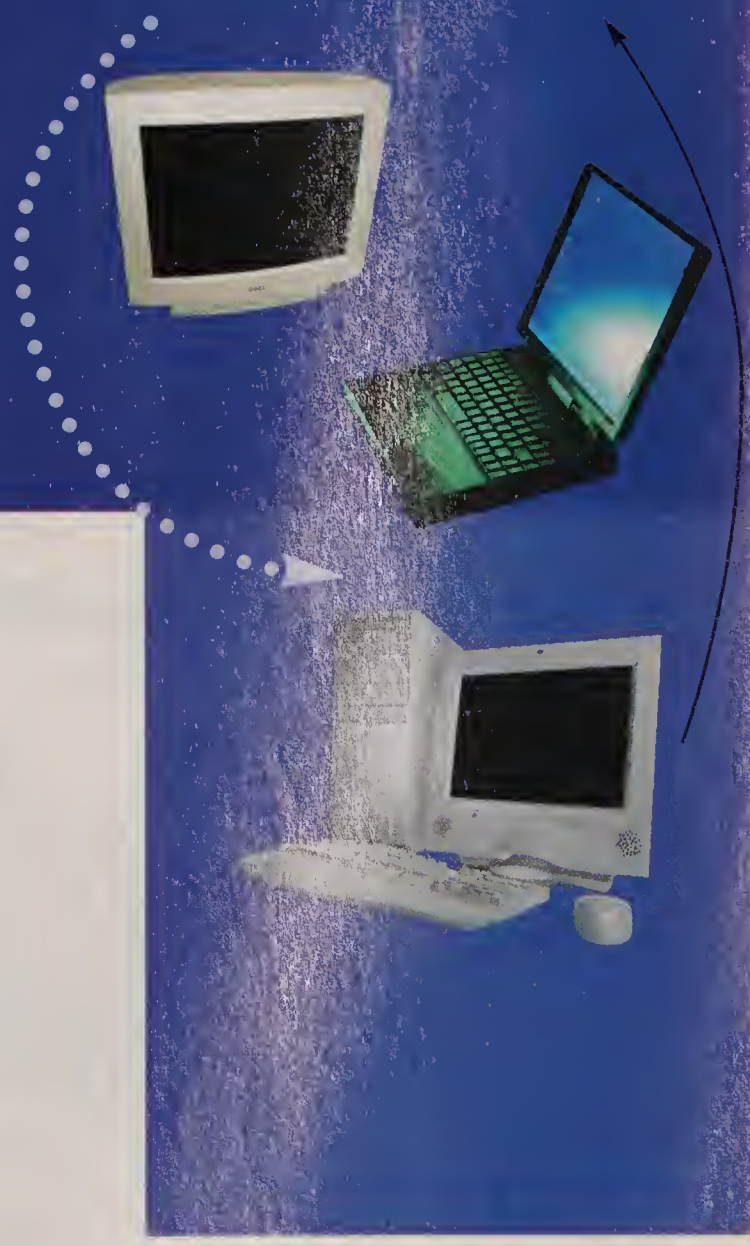

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STEPHEN MANES

Sick of Blue Screens? Get a Mac!

MAC HEADS ARE DISSING our machines again! Nothing new about that—except that now they're doing it on television in commercials paid for by Apple. They're calling Windows machines "horrid" and "clunky" and "unwieldy." They're even saying that they're "disgusted!"

You're probably thinking, "So what? They're like a religious cult. Apple's last big campaign featured famous dead people who'd never touched a computer, let alone a Mac."

But now they're bringing up the Blue Screen of Death! In public!

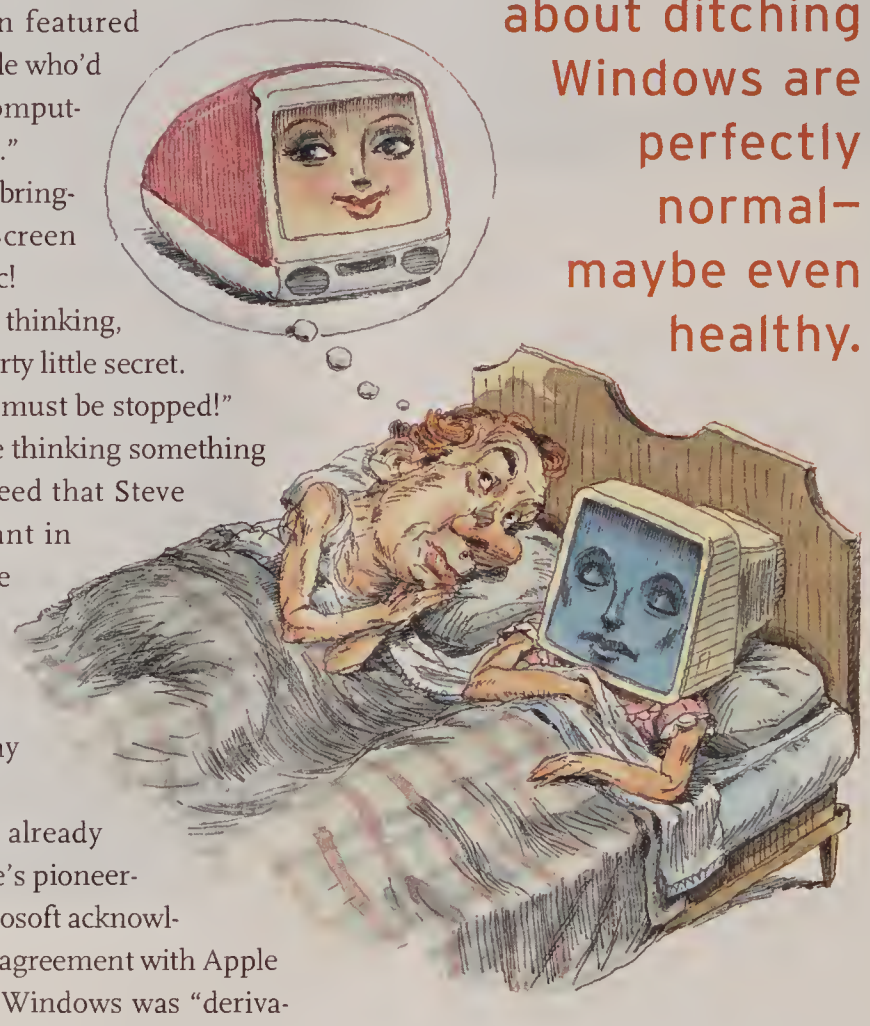
You're probably thinking, "Hey, that's our dirty little secret. These Apple guys must be stopped!"

Or maybe you're thinking something else—the Appleseed that Steve Jobs wants to plant in your brain: "Is the Mac really easier and more reliable? And should I consider it for my next computer?"

After all, you're already using lots of Apple's pioneering concepts: Microsoft acknowledged in a written agreement with Apple back in 1985 that Windows was "derivative...of the visual displays generated by Apple's Lisa and Macintosh." And from Windows 1.0 to XP, the operating system has grown more Mac-like, not less.

Then there's innovation. The 3.5-inch floppy disk drive? First seen on the original Mac. Wireless networking via 802.11b (Wi-Fi)? As AirPort, it rolled out first in Macs. And Macs had built-in ethernet when it was a mere add-on for PCs. Although these technologies weren't invented at Apple, it committed to them long before they trickled down to Windows.

Don't fret: Fantasies about ditching Windows are perfectly normal—maybe even healthy.



Some things *were* invented at Apple, including one advance now in every Mac: FireWire. Too bad the high-speed port (aka IEEE 1394) has been slow to catch on in PCs, in part because of the even slower-to-arrive copycat USB 2.0 standard. And the Mac is often far more elegant: Thanks to Apple software, editing digital video or burning a DVD on a Mac is almost a pleasure. On PCs, it's almost always a pain.

Windows users just get used to annoyances that Mac users don't have to put up with. Exhibit A: the Registry. That nightmarish Microsoft innovation means it's far easier to move applications between Macintoshes than it is to go through the grueling reinstallation process that keeps PC users clutching their current machines rather than upgrading.

GO TO APPLE.COM/SWITCH?

PRIOR VERSIONS of the Mac OS managed memory poorly and crashed more often than Windows. My limited experience with OS X suggests that these problems have largely been corrected. Still, the Mac is far from perfect. I continue to prefer the PC's windowing interface, its lack of proprietary connectors, and its freedom of hardware choice (particularly in laptops, where I like 'em small and Steve Jobs apparently doesn't).

But every day that brings a Blue Screen of Death, a networking disaster, or a collection of security warnings from Microsoft is a day that more Windows users will consider making the Big Switch. And while there's no hard evidence that Apple is developing an Intel version, consider this: If OS X were available for the machine you have now, wouldn't you be frustrated enough with Windows to give it a try? ■

Contributing Editor Stephen Manes, a cohost of the public television series Digital Duo, *has written about PCs for nearly two decades.*

ILLUSTRATION: JOHN CUNEO

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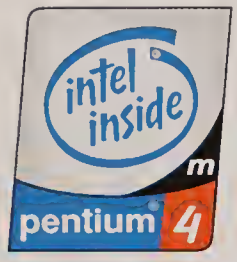

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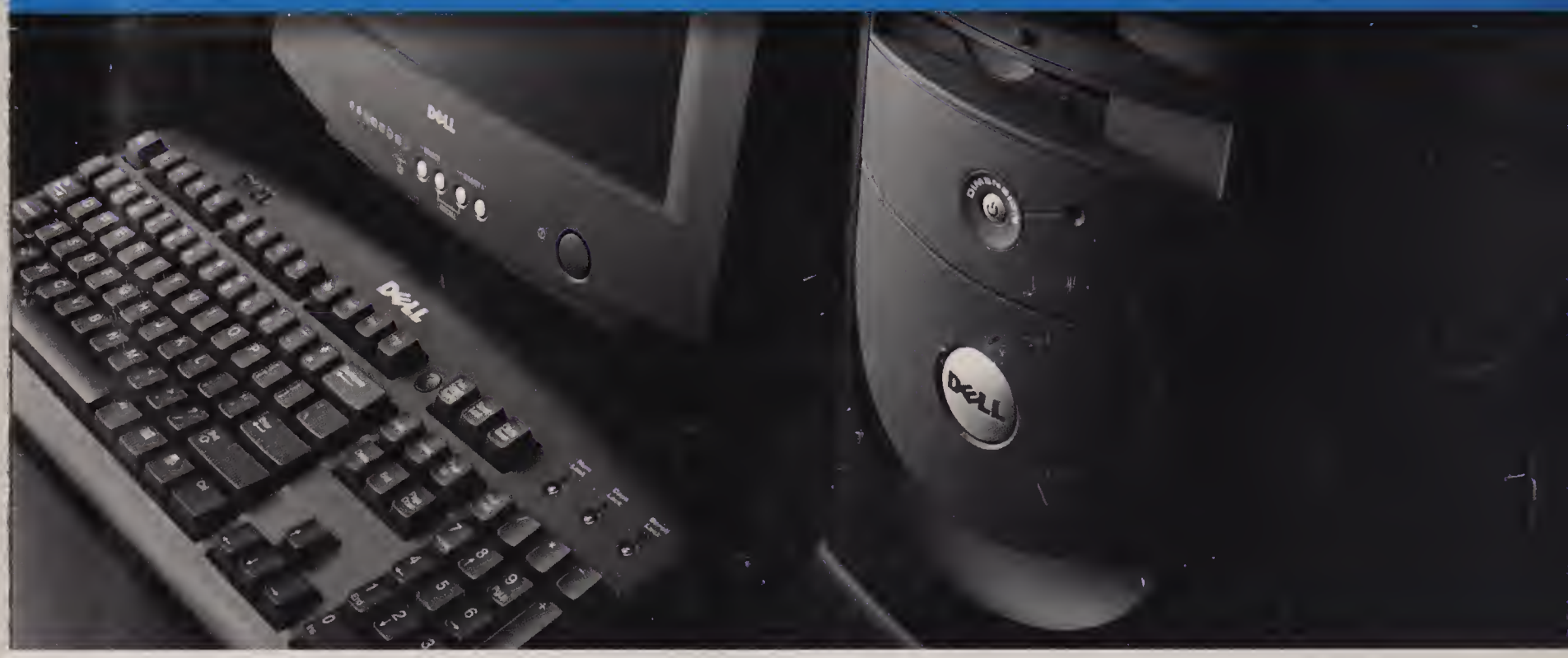

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